

C-DOT DSS FAMILY

WORKSHOP

ON

C-DOT DSS PRODUCTS

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Chapter 1.

Introduction

C-DOT has conducted about 30 Workshops in various Telecom circles from September 97 to December 97. The objective of the workshop was to introduce the Regional access (90) feature in 256P RAX/SBM and MBM exchanges and discuss other new features available. Each workshop was followed by a practical training session in various exchanges. The software upgradation procedure both for 8.9 and 5.23 existing software in SBM/MBM and for 1.04P & 1.05 in 256 RAX were also demonstrated to a group of officers nominated by the circle. This training helped these officers to carry out the job in other exchanges. Workshop also covered presentation on new features like common channel signalling (CCS7), Network Synchronization and Enhanced Subscriber Unit (ESU). Software highlights of Rel. 5.43, field problems, MAX to ILT conversion, SBM to RSU conversion and software tools like BMON, COMaC, RGEN and CEMS were also discussed. The list of sites and number of participants is given in Table-1.

The objective of this document is to put all such things which were covered in the workshop, so that it can be circulated to all such users who could not attend the workshop.

This document has been organised to cover Post cutover management - supports available from C-DOT in Chapter 2. In Chapter 3 current hardware and software status has been covered. Chapter 4 exclusively deals with Regional Access (Level 90) implementation in detail. In Chapters 5, some known field problems related to installation, Data Creation and procedure have been listed. Chapter 6 deals with Do's & Don'ts. Chapter 7 deals with the field problems/enhancement reported during the workshops done by the C-DOT Chapter 8 covers most of the enhancements being propagated by C-DOT.

Table - 1

Circle	Site	No. of Participants
ALLTC	Ghaziabad	21
Andhra Pradesh	Kakinada Hyderabad	75 32
Assam	Guwahati	21
Bihar	Patna Ranchi	26 26
Gujrat	Ahmedabad Rajkot	33 25
Haryana	Kurukshetra	8
Himarchal Pradesh	Simla Mandi	33 27
Karnatka	Mysore	39
Kerala	Trivendrum	33
Madhya Pradesh	Bhopal Raipur	32 32
N.E.	Shillong	36
Orissa	Bhubaneshwar	35
Punjab	Chandigarh	37
Rajasthan	Jaipur	32
Tamil Nadu	Thiruneveli Salem	33 29
U.P. East	Kanpur Azamgarh	35 30
U.P. West	Merrut Agra	16 20
West Bangal	Calcutta	21
Maharashtra	Kolhapur Goa Nanded Pen	27 30 43 18

Chapter 2.

Post Cut-over Management - Support from C-DOT

In the National Telecom Network, all the C-DOT exchanges are installed and subsequently maintained by DOT staff. C-DOT provides requisite support to DOT in Installation of exchanges, Expansion work, Day to day operations, Network modifications, solving critical site problems and Hardware/Software upgradations.

For day to day technical help required by the site personnel, centralised "Control Rooms" are set-up at Delhi and Bangalore, where the problems from site are registered analysed and solutions/get arounds given on telephones. For the problems which can not be solved on phone, site visit is planned to take detailed observations and fixing the problem.

In addition to installation and Maintenance activity C-DOT conducts one week condensed hands-on maintenance oriented training programs as well as workshops on C-DOT Products at circle level for the DOT staff.

The other support provided by C-DOT is as follows:

– **Release of Application Notes**

C-DOT prepares Application Notes for various field requirements. Application notes on the following topics have been released so far.

- Software Installation and Data creation
- Description of Traffic Reports
- Procedure to Recover SBM/MBM exchange
- Concentration TIC Trouble shooting
- Digital Trunk Equipage in Line Module
- Hard Disk installation
- Switch Units and Associated Cards
- Report Generation/CMD Utility Floppy
- SBM - TAX

- Expansion of C-DOT MAX-L Exchange
 - Replacement of 1.2 GB / 2.1 GB Hard Disk in IOP
 - Basic Programming & Data Creation in 256-RAX
 - Conversion of SBM into MBM
 - Bill Monitoring Utility
- **Training support**
- Regular support to ALTTC for some topics. Lecture support is provided to RTTCs whenever desired.
- **Release of Software Tools (Utilities)**
- C-DOT keeps on releasing some small utilities which are helpful in expediting the installation work or easing the maintenance works.
- **Software/Hardware Upgradation**
- Based on field problems/enhancements/requirements, C-DOT keeps on enhancing the hardware and software. In the initial phases, C-DOT associates with the DOT staff to carryout this job which is subsequently done by the DOT staff on their own.
- **Generation of Software Deliverables**
- New software in cartridges and PROMs is provided to various sites for upgradation of their software versions. Cartridges and PROMs are generated in C-DOT office and is sent by parcel wherever desired on replacement basis.
- C-DOT has spent 1364 Mandays at sites for installation and operation support to DOT in 12 months from January 1997 to Dec. 1997. Mandays spent month wise are depicted in Fig. 2.1.
- Problem Analysis for a representative month of November, 1997 is shown in Table - 1.
- Analysis of calls attended at Control Room for 12 months period from January 1997 to December 1997 is shown in Fig. 2.2.

MANDAYS SPENT

Jan97 - Dec 97

Total Mandays = 1364

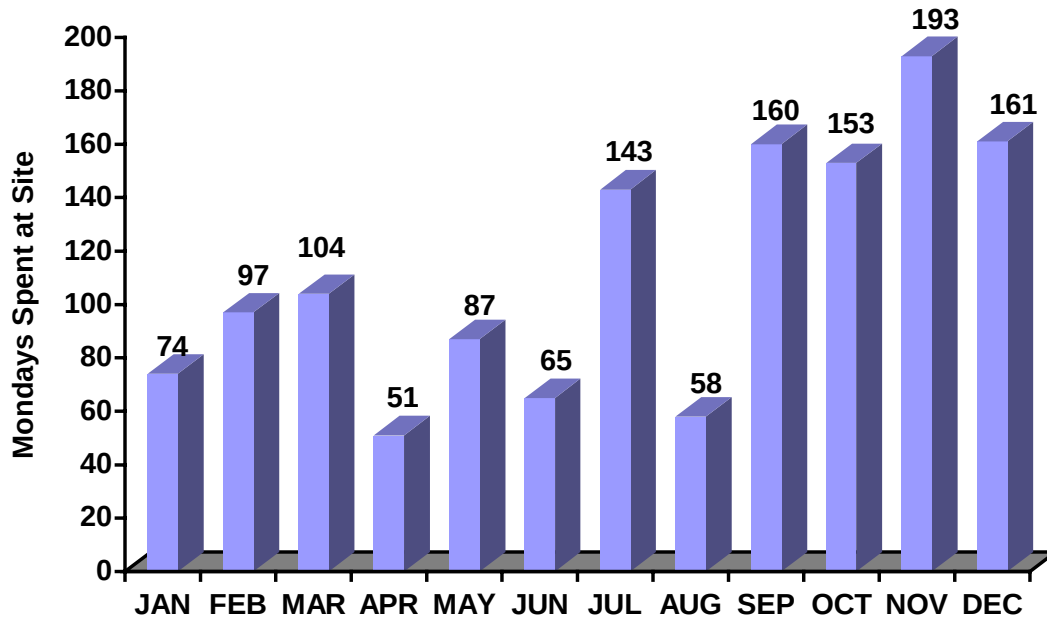


Fig. 2.1

Table - 1.
PROBLEM ANALYSIS
FOR THE MONTH OF NOV 1997.

Total Problems Reported : 808

1.	Hardware Related	:	213
	BM/CM	:	119
	IOP	:	32
	IOP Peripheral	:	48
	Miscellaneous	:	10
	RAX	:	5
2.	Procedural	:	203
	RAX	:	15
	Data Creation	:	14
	IOP Related	:	61
	Man Machine Commands	:	24
	Utilities Related	:	18
	Miscellaneous	:	74
3.	Software Related	:	137
	Data inconsistency	:	27
	Software Recovery Overflow	:	10
	Miscellaneous	:	100
4.	Down	:	12
	Due to Software	:	5
	Due to Hardware	:	7
	Due to Power	:	0
5.	Exchange Networking	:	4
6.	Information	:	100

CALLS ATTENDED AT CONTROL ROOM

Jan 97 - Dec 97

Total Problems Attended = 6215

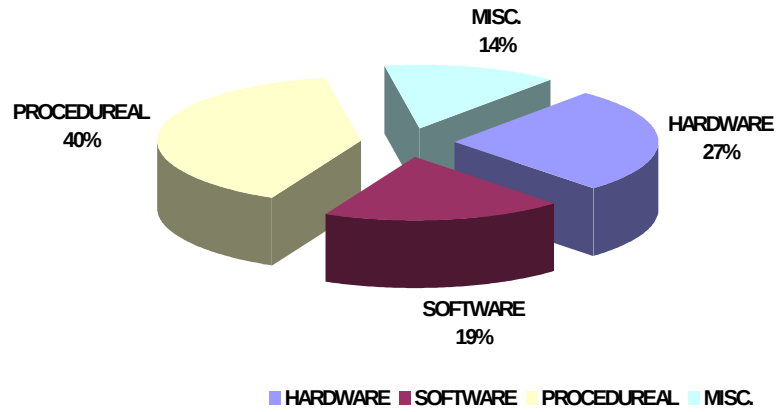


Fig. 2.2

Chapter 3.

Hardware and Software Status

3.1. 256P - RAX

3.1.1. Software Release 1.05

Three basic configurations 'A', 'B' and 'C' were standardized for different applications. Till Sept. 1997, all the RAXs were being despatched to sites with software release 1.05. Some Field problems reported from different sites in V1.05 are listed below :-

- ◆ Meter spurts For 1st intra RAX call after power-on in case of copy change over during the call.
- ◆ Irrelevant announcement/tone after copy switchover during tone/announcement phase.
- ◆ Trunk offer not successful after diagnostics on conference card.
- ◆ Conference after trunk offer is through only for one unit period when intra call rate is other than unit fee.
- ◆ Different announcement is fed for blocked/LLO subscribers for Local & MF trunk call.
- ◆ Slot 02/08 & 02/09 cannot be given as start/end addresses for RTC calendar driven tests.
- ◆ DCR Print out by date & month not possible for Feb. 29.
- ◆ RTC fault & RMF faults during RTC calendar driven tests at times.
- ◆ MF transit calls on linked level land on RAX subscribers of block 2 and 3 if the last 3 digits are same.
- ◆ DT30 channels I/C to RAX from E-10B get blocked & can be released from RAX end only.
- ◆ Calls on TAX directions having 90 seconds tariff, getting disconnected from RAX side.

3.2. NEW SOFTWARE RELEASE 2-1-1 (1997)

Software version 2-1-1 for 256P RAX was introduced in September, 1997 to overcome various field problems mentioned in para 3.1.1. In addition, this new s/w release supports REGIONAL-ACCESS on route '90'.

3.2.1. New Features in V2-1-1 w.r.t. V1.05

- ◆ Detailed Billing and Detailed Call Records (DCRs) for Trunk Groups. DCRs are now available for I/C, O/G and transit calls on TGP's. Printouts of records can be taken for I/C TGP's, O/G TGPs.
- ◆ Modifiable Super User Password
Each exchange can have a unique Super User Password and thus providing a higher database security.
- ◆ Separate counters for superuser login and number of superuser password changes have been provided.
- ◆ 7 levels of dynamic (OG) restriction available to facilitate regional access.
- ◆ **Special Treatment for route '90'.**
'90' can be programmed as regional STD route. 'Regional Access' falls between STD and Local access in hierarchy. DCRs will be generated for '90' calls along with STD & ISD.
- ◆ Dynamic O/G Restriction facility possible for subs having access OG-UPTO-LCL also.
- ◆ **Restriction on STD/ISD facility for CCB subscribers without home metering eliminating misuse from payphones.**
- ◆ 18 digit storage capacity
- ◆ PCM Type III signalling provided on DT30, in addition to Type I & II already available.

Centralised Operation and Maintenance Centre (COMAC)

COMAC support has also been implemented to enable the Centralised Maintenance. An number of C-DOT 256 RAXs can be monitored through a centralise PC-AT connected by leased/dial-up modems. For details, refer chapter on COMAC.

3.3. SBM RAX/MAX-L/MAX-XL SOFTWARE STATUS

3.3.1. Previous Software Release 1_4_5.23_3 (1996)

This was a major release over s/w P8.9, which solved most of the constraints/problems observed in P8.9 and supported various new features and enhancements as desired by DOT. Major highlights of this release are listed below -

◆ **Generic Release to support**

- ★ SBM-RAX
- ★ DSS-MAX (Local)
- ★ DSS-MAX (ILT)
- ★ DSS-MAX (with RSUs)
- ★ DSS-TAX
- ★ DSS-MAX-XL (Large capacity exchange of 30000 lines & 6000 Trunks)

◆ **Supports different release of hardware**

- ★ Existing hardware with CPU-S04/S05 alongwith 2 MB memory cards.
- ★ Existing hardware with CPU-S04/S05 with 16 MB TME cards replacing four 2 MB memory cards in BPU and two 2 MB memory cards in SCU/APU.
- ★ New release of Phase-2 hardware based on only two cards (BPC & BME) eliminating the BIC and BID cards. BIC card merged in BPC card and 4 memory cards and one BID card merged in BME card.

◆ **Supports different version of IOPs.**

- ★ Old version of C-DOT IOP with 70 or 70 + 70 MB disks and 2 MB or 8 Mb memory cards.
- ★ Existing version of C-DOT IOP-VL
- ★ New version of C-DOT IOP-VH

♦ Exchange Operations Enhancements (1_4_1_3)

- ★ Exchange code modification to a new exchange code with the same or different code/directory number length
- ★ Unequipping of an already equipped frame is possible by using CRP command
- ★ On-line mapping of tones & Announcements as per requirement
- ★ Enhanced sets of Audits for better resource management
- ★ Terminal privileges are implemented for operator terminals.

♦ ILT/TAX Features (1_4_1_3)

- ★ Semi-compelled MF signalling for satellite channels
- ★ International CCITT-R2 signalling
- ★ Increased number of routes (Max. 2048)
- ★ Increased number of trunk group categories (Max. 64) to support enhanced requirement of routing/charging
- ★ Increased depth of analysis for route codes (Max. 12 digits)
- ★ Increased BHCA handling by shifting the task of metering to peripheral hardware units (TIC/TUC)
- ★ Call Routing Tone for DECADIC routes
- ★ Creation of TGP by name (10 ASCII characters)
- ★ 3 digit as well as 4 digit level-1 routes supported
- ★ Operator Assistance position '111' supported for Network call.

♦ Metering/Billing Enhancements (1_4_1_3)

- ★ Bulk counter for each subscriber has been provided for total meter readings (Local + STD)
- ★ No charging of single unit in case of partial dialling for STD/ISD calls
 - Media/Network related problem but taken care-of at C-DOT exchange
 - Problem is solved for MF-routes
 - Problem can not be solved for DECADIC - Routes
- ★ Actual charging for calls in the cases —

- Dialling by Equipment Number Call
- Kill call
- Making the involved terminals OOS-OPR
- Disconnection of call because of network problem
- ★ Enhancement for Commercial Bill Records. Records for a particular day can be deleted.

◆ **Enhanced Traffic Reports (1_4_1_3)**

- ★ Route Code Report
- ★ Hunt Group Report
- ★ Both way trunk group report
- ★ SIF Traffic Report
- To interrogate the utilisation of different subscriber initiated features i.e., Dynamic Locking, Morning Alarms, Call Queuing etc.
- ★ DTK Traffic Report (RSU feature)
- Equipage/availability of voice channels between RSU module and main exchange
- Traffic intensity between RSU module and main exchange.

◆ **Enhanced Maintenance Support (1_4_1_3)**

- ★ Simultaneous down-loading of code and patch for 16 BMs for faster restoration of services in case of exchange failure. This will reduce installation time also.
- ★ Modified patch initialisation strategy for down-loading of patch files in very short duration.
- ★ Terminal Fault Handling
- Alarms for number of subscribers under LLO (PG) condition exceeds threshold value
- Interrogation OOS-EXT subscribers
- Alarms for killer trunks & service circuits
- ★ Functional test on MF circuits for all the frequency components
- ★ Enhancement of answering circuit report to include more details of failures

- ★ Different thresholds for small/medium large trunk groups to raise/clear the alarms
- ★ Remote alarms reporting/fault monitoring from subscriber line
- ★ Fine tuning of subscriber line parameters as per the condition of outdoor cables/network. This can also be defined by the user.
- ★ Fine tuning of the call handling capacity by optimising the call processing and improved over-load control management strategy
- ★ Enhanced over-load control reports along with more details which will help in on-line over-load control management.
- ★ It will not be possible to delete 'bd' group through crp.
- ★ It will be possible for AP/BP to establish link with OOS-OPR IOP when the active IOP becomes OOS-SYS.

3.3.2. New Software Release 1_4_5.43_3 (1997)

This release supports Regional Access Level '90' feature in addition to all the enhancements incorporated in 1_4_5.23_3. New features introduced in this release are listed below:-

- ◆ 16 PCMs connectivity between RSU's & Main Exchange.
- ◆ Trunk Interface in RSU.
- ◆ IOP-VH Hardware Support.
- ◆ Booting of IOP with Unix Cartridge, as minload floppy not required now.
- ◆ Making IOP out of service due to lack of disk space (when disk space availability goes below 5% of Total Disk space) to prevent data corruption.
- ◆ Implementation of Tariff rate of 1/3rd of the Full rate and new charge rate Number for '90' sec. pulse in BMDC.
- ◆ Calling Line Identification (CLI) with area code sending capability.

3.3.3. New Software Link 1_4_2.25_4 (1997)

This release supports 'REVENUE METERING' on trunks, calling Line presentation (CLIP) and Regional Access '90' feature in addition to all the features of software release 1_4_5.23_3. Main highlights of this release are listed below:-

- ◆ Meter counter for each Trunk group whether I/C, O/G or B/W.
- ◆ Detail Billing for Trunk Groups, put under Billing observation.
- ◆ Centralised Automatic Message Accounting (CAMA) on I/C Trunk Groups with MOD-R2 signalling.
- ◆ Calling Line Identity Presentation (CLIP) to analog subscribers.
- ◆ Identification of the faulty subscriber port, causing Terminal Tester Card (TTC) to go out of service.
- ◆ CLI support across the network when C-DOT Exchange is used as TAX.
- ◆ Support for 'Regional Access' Level '90' feature.

3.3.4. New Software Release 1_4_8.1_3 (1997)

This software release has been introduced for MAX-XL exchanges only. This includes all the features of software release 1_4_5.43_3. In addition, this link supports Network Synchronisation and CCS7 signalling.

3.4. SBM-RAX/MAX-L/MAX-XL - HARDWARE STATUS

Initially the C-DOT SBM-RAX and MAX hardware have been commissioned at the sites with CPU-S04 processor cards alongwith 4 nos. of 2 MB memory cards in BPU, and 2 nos. of 2 MB memory card for SCU and APU. As a part of continuous product upgradation efforts, the hardware being used in the C-DOT exchanges are being update time to time. The few of considerations, leading to hardware updations are listed below —

- Component obsolescence
- Increased traffic handling capacity
- Cost optimisation
- Optimising the number of hardware modules for easy maintenance.

However, these upgradations are not mandatory for the existing exchanges. Till now, successful efforts have been made that all the new software releases (including latest Software release 1_4_5.43_3) are compatible to old Software and Hardware release with only one exception for C-DOT RSU sites. In case of RSU sites, the 2Mb

memory cards, being used in Remote BM (RSU BM) as well as in APU and SCU in CM, are to be replaced by 16 MB TME card. BMs in parent exchange can continue to have 2 MB cards.

Since, all the C-DOT SBM-RAX exchanges are being despatched with new 16 Mb TME cards. For the RSU sites TME card requirement can be met by inter changing the hardware at SBM-RAX and RSU sites. This will avoid any additional expenditure for the procurement of TME cards for RSU implementation at the existing sites.

3.4.1. SBM RAX/MAX-L Hardware

- ◆ New version of TIC Card APC-TIC002/F-S10 introduced to take care component obsolescence.
- ◆ ISP Card (ASIC Design) introduced replacing SPC card to increase reliability.
- ◆ Remote Time Switch (RTS) card introduced to be used in place of Time Switch Switch (TSS) card for RSU-BM. This card supports 4 PCMs (2 PCMs per BUS) connectivity between RSU and Main Exchange.
- ◆ Introduction of Enhanced Time Switch (ETS) card in place of RTS card to support 16 PCMs (8 PCMs per BUS) connectivity between RSU and main Exchange.
- ◆ Introduction of Remote Switch MUX (RSM) card in place of Space Switch MUX (SSM) card to be used in CM-L corresponding to RSU-BM. RSM Card provides interface for one RSU-BM and one colocated BM and supports 4 PCMs (2 PCMs per BUS) connectivity between RSU and Main Exchange.
- ◆ Introduction of Enhanced Space Switch MUX (ESL) Card in place of RSM unit to be used in CM-L for 16 PCMs (8 PCMs per BUS) connectivity between RSU and Main Exchange.

3.4.2. MAX-XL Hardware

- ◆ New CPU Card in Base Processor Unit (BPU) as APC-BPC 441/0-S02. BIC Card will not be required with BPC.
- ◆ New Memory card of 16 MB as APC-BME 442/H-S02, in which BID Card has been merged.
- ◆ With this configuration BHCA handling capacity of BM-XL will increase to 12500.
- ◆ BM-XL RSU, Same RTS/ETS cards will be used for 4 PCMs/16 PCM connectivity respectively.

- ◆ CM-XL has been designed to support 32 BMs connectivity. It will support a maximum of 16 Remote BMs (RSUs).
- ◆ CPU (BPC) and Memory (BME) Cards are used in AP & SSC frames.
- ◆ Introduction of High Performance CPU (HPC) Card and Base Message Switch (HMS) Card to be used in BM-XL. With this configuration BHCA capability of BM-XL will increase beyond 25000.
- ◆ Introduction of High Performance Messages Switch (HMS) Card in Central Message Switch (CMS).
- ◆ Introduction of High Performance CPU (HPC) Card in AP & SSC. With the use of HPC in BP, AP & SSC and HMS Cards in BMS & CMS, the BHCA capability of MAX-XL exchange will increase to 8 Lakh.
- ◆ Introduction of Enhanced Space Switch MUX (ESM) Card in CM-XL for 16 PCMs connectivity between RSU and Main Exchange.

3.4.3. RSU (Remote Switch Unit) Hardware

- ◆ No Hardware Difference between Normal BM and RSU except TSS Card to be replaced by RTS or ETS.
- ◆ BM-L and BM-XL is to be used as A/C RSUs.
- ◆ BM-L to be used for Non A/c RSU.
- ◆ No Hardware Difference in NON A/c & A/c RSUs. Only component packaging is different for some of the components. For Non A/c RSU it is Ceramic Packaging.

3.5. C-DOT IOP-VL (1995)

- Newly designed C-DOT IOP-VL in Tower type model
- To be used in C-DOT SBM/MAX-L exchanges
- Built around only two cards and one power supply module
- Increased throughput
- Easy maintenance
- Cost optimisation
- Increased disk space of 2.1 GB against 70 or 140 MB in existing version of IOP
- Use of standard SCSI - Interface peripheral for easy availability

3.6. C-DOT IOP-VH (1997)

- Newly designed C-DOT IOP-VH in IOP-VL cabinet.
- To be used SBM-RAX/MAX-L/MAX-XL Exchanges.
- Built around only one card (VHC) and one Power Supply Module.
- Much Improvement in throughput over IOP-VL
- Ease of Maintenance.

Chapter 4.

Regional STD (Level 90) Implementation in C-DOT SBM/MBM and 256P-RAX

In order to implement Regional STD (Level 90) feature in C-DOT SBM/MBM, these exchanges have to be upgraded to Software Release 1_4_5.43_3. Exchanges having S/W Release 1_4_1_4 have to be upgraded to 1_4_2.25_4 to implement this feature. In 256P-RAX, this feature can be provided in S/W Release V2-1-1.

4.1. IMPLEMENTATION OF LEVEL '90' REGIONAL STD IN C-DOT SBM/MBM

4.1.1. Definition and Dialling Plan

- ◆ With this feature, a STD/ISD Barred subscriber will be able to dial within the LDCA in which they are located.
- ◆ The subscriber shall dial the following for calls to another SDCA within the same LDCA.

★ 90 + Area Code + Subscriber No.

e.g. 90 WXYZ ABCDE, Where 90 - Access Code

WXYZ - Area Code for SDCA

ABCDE - Subscriber Number

4.1.2. Implementation in C-DOT SBM/MBM

- ◆ A new level of Access Barring is added between LOCAL and NATIONAL, named as **“OG-UPTO-REG”** i.e. **“Outgoing upto Regional”**

◆ The Hierarchy of Access Barring

OG-UPTO-10X

OG-UPTO-LCL

OG-UPTO-REG

OG-UPTO-NAT

OG-UPTO-INT

- ◆ All subscribers having ACC-BARR as OG-UPTO-REG and above can access level '90'.
- ◆ Subscribers with Access Barring OG-UPTO-10X and OG-UPTO-LCL cannot access Level '90'.
- ◆ For activation/deactivation of this facility service code is '45'.
- ◆ Detailed Bill Records will be maintained for level '90' calls along with level 0/00 calls.

4.1.3. Data Creation for Regional STD Level '90'

4.1.3.1. Data Creation in SDCA as Local Exchange

1. Verify that system parameter XCHG-TYPE is having value '2' only.
2. Note down the parameters of route '0' (Do not delete it).
3. Create route '90' with exactly same parameters as that of route '0', i.e. DGT-LGT, TGP-CHC, RUT-FLG, CRG-RTN.
4. Check that 'ROD' = 1 for O/G TGP used for route '0' or '90'.

4.1.3.2. Data Creation in SDCC TAX/LDCC TAX

1. Verify that system parameter XCHG-TYPE is '4' or '32' only,
2. Note down all the parameters of route of all the SDCAs of your LDCA. (Do not delete them)
3. Create new route 9 + 'existing route codes' of SDCAs of this LDCA only, as noted in step 2. These routes will have same parameters as noted in step 2, except 'DGT-LGT'. If DGT-LGT parameter is having value <16 (i.e. close Numbering), say n, then while creating new routes, DGT-LGT = n+1, should be given. If DGT-LGT = 16, then create new route with default value (=16)
4. Note that for these routes are same TGPs with same ROD as of routes '0xxxx' of SDCAs will be used.

4.2. IMPLEMENTATION OF LEVEL '90' REGIONAL STD IN C-DOT 256P RAX

- Level '90' can be programmed as 'REGIONAL STD' route and will have special treatment in software.
- Regional Access '90' falls in between 'LCL' & 'STD' in hierarchy.
- To access Level '90' calls, subscriber should have access upto 'REGIONAL' or above.
- Dynamic Locking/Unlocking for Regional Access has been provided in database.
- Detailed Call Records (DCRs) for '90' calls will be kept along with STD/ISD DCRs.

4.2.1. Data Creation for Regional STD Level '90'

- ◆ Open Direction '9' as 2nd Digit Analysis
<CNFG> <1> <9> 2nd DGT Analysis = Yes.
- ◆ Add Any spare Route No. to Direction '9'
<CNFG> <3> <9> <route No. 22 'say'>
- ◆ Add same TGP which has been allotted for Route Code '0' (TAX-Route).
<RUT> <22> <1> <TGP-No.>
- ◆ Change 'OGCC' of this route No. '22' and keep its value same as defined for Level '0' (TAX) route.
<RUT> <22> <6> <NXT> .. etc.
- ◆ Add 'Regional STD' direction '9'
<AUX> <8> <1> <1> <9>
- ◆ Add Route Code '90' & "Route No 22" to REGIONAL STD TABLE
<AUX> <8> <2> <1> <90> <22>.

Chapter 5.

Known Field Problems

This chapter presents the categorisation of various field problems with their suggested solutions. These problems have been categorised mainly in three different heads namely Installation, Data Creation and Procedural.

5.1. INSTALLATIONS RELATED PROBLEMS

SL. NO.	PROBLEM	REMARKS
1.	Earth Resistance	It should be less than 1 ohm.
2.	Two separate earths.	♦ Earths for Electrical (AC) and Exchange earth (DC) should be laid separately.
		♦ Minimal distance between the two should be ensured
		♦ AC & DC earths should never be allowed to get mixed up in the exchange at any point.
		♦ Inverter chassis should be grounded to exchange earth.
3.	Antistatic Flooring	♦ Only antistatic material should be used.
		♦ It should be ground to exchange earth via 1 Mohm resistance.
		♦ Slippers should not be used while handling cards in the exchange.
4.	All the equipment to be grounded.	IOP, BM, LM, MDF, etc., should be properly grounded as per the installation document.
5.	High DC voltage drop at the IOP in SBM systems.	♦ Length of the supplied power cable from PDP to IOP is 25M. This leads to high voltage drop at the IOP
		Reduce the length of the IOP cable to actual requirement by cutting the cable and soldering it again.
6.	MCB at LM Tripping	♦ In earlier supplied systems, capacity of MCB is 10A. Sometimes when the current absorbed exceeds 10A in the LM, MCB trips.
		♦ Replace the 10A MCB with 16A.
		♦ New despatched systems are already having 16A MCB.

SL. NO.	PROBLEM	REMARKS
7.	Preparation of E&M cables in MBM exchanges.	♦ While preparing E&M cables in MBM exchanges, care should be taken to ensure that 1st pin of the 32 pin connector is left blank. The first circuit wiring should start from 2nd pin.

5.2. DATA CREATION PROBLEMS

SL. NO	PROBLEM	REMARKS
1.	Proper IOP ids at the time of loading.	Both the IOPs may be loaded as IOP-0 or IOP-1 due to mistake. This will lead to problem in duplexing the IOPs.
2.	RoutinRouting to 'X' (Default = 6).	'Routing' Parameter comes into picture only for those routes for which Open Numbering Scheme has been used. e.g. for a route '21' xxx, Open Numbering Scheme has been defined and 'routing' parameter has default value '6', then calls will not pass for this route. Then value of Parameter 'Routing' has to be changed to '5' or use close Numbering scheme.
3.	At the time of creating I/C TGP, parameter against PFX-DGT is entered '0'	It is taken as prefix digit 0. For prefix 'NIL' only default value is to be given. If by mistake 0 has been given instead of NIL then delete/create TGP again.
4.	MF-senders/MF-receivers should be distributed on all the MFC cards of TRUNK BMs in MBM exchange.	Failure of one MFC card will result in blocking of O/G calls, if say 15 MF senders are created on MFC1 and 15 MF receivers are created on MFC3. DTMF circuits not required.
5.	Only DTMF circuits are to be created in LINE BMs in MBM exchange.	MF- senders/Receivers are not required in LINE BMs.
6.	When TGPs are created with E&M circuits, first four TENs of the slot is to be used in I/C TGP and last four TENs for O/G TGP or vice- versa.	Otherwise E&M trunk testing may not be possible because of unavailability of trunks.
7.	While creating a route other than 0, default value of digit length (16) should not be given.	Open Numbering scheme should be used only for route '0'. Other routes should be opened with closed numbering scheme.
8.	Charge rate numbers not defined properly.	Satellite exchange should have charge rate numbers with ini-charge = 0. For self exchange subscribers (category 1) charge rate numbers allocated should have ini-charge = 1.
9.	In charge rate numbers ensure that ring info column should have normal ring except for special services.	Specially Charge Rate numbers 1 and 40 which are used for TAX calls, should have ring information as normal, otherwise TAX junctions will remain busy for no reply calls for 4 minutes.
10.	While creating trunk group dial tone parameter should be no except for trunk operator trunk group.	If it is not defined for other routes also than it will unnecessarily load the exchange software.
11.	Trunk group category should be defined properly. For I/C TGP of	Same conditions holds good for other routes also.

SL. NO	PROBLEM	REMARKS
	TAX, it should be allowed while creating RAX routes. Otherwise calls from TAX to RAX will not pass.	
12.	DTMF instruments should be provided to the subscribers where in data DTMF facility is given. Also subscribers should be educated to use the DTMF feature.	If it is not done, this will unnecessarily load the system software.
13.	Rerouting of calls coming from TAX to TAX again.	I/C TAX TGP category should be other than 1 and this category should not be allowed on the O/G TAX route. Otherwise calls will be routed from TAX to TAX again leading to charging problems.

5.3. PROCEDURAL PROBLEMS

SL. NO	PROBLEMS	REMARKS
1.	Proper synchronization procedure not followed e.g. INIT-IOP: 5, 1; on the OOS- IOPs.	OOS-IOP should be made INS through the active IOP only.
2.	Short-cut procedure to bring down the IOP by switching-off the power or by resetting for bringing the IOP to cold-start.	Leads to data corruption. Proper shut-down procedure should be used. init-iop: 2,1; and init-iop: 1, 1; should be used.
3.	'ed', 'bd' and 'bc' backup is not taken regularly.	Loss of meter reading data during exchange restoration after complete failure in cases where, loading of software is required.
4.	Disk cleaning.	IOP-Synchronisation failure takes place if no space is available on the disk. Proper cleaning should be done before synchronisation.
5.	Replacement of cards	Ensure the following-Hardware Compatibility--S/W version of PROMs-Jumper settings if any.
6.	Switching off the PSU	Ensure that all the switch units being served by that PSU have been made OOS-OPR, otherwise those units will become OOS-SUS unnecessarily putting load on system software.
7.	Deletion of Ed	While cleaning of the disk, ed group should never be deleted.

Chapter 6.

Do's and Don'ts (w.r.t. S/W Release 1_4)

1. Check the status of the system daily by using crp command displ-sys-all;
2. Check the Disk space on both the IOP's daily by giving command
iop5x>df

It should always be more than 5000 blocks in /data. If it falls below 5000 blocks then do disk cleaning using crp command del-fgp-file for tf, trnsf, bc and ioh groups, after taking the backup for 'bc'.
3. If one of the iop is required to be brought down to warm start use command init-iop:2, 1;
4. Do not execute the DGN-SWU command with the parameter RPT-OPT = Y
Always use default values.
5. Do not give tst-trm for different type of trunks (OG, IC & BW) at the same time in same command.
6. Do not remove floppy/cartridge drive till the LED is glowing.
7. For satellite exchanges the charge rate number used should have ini-crg as 0.
8. Modify day type on every Jan 1 and July 1 using command mod-day-typ.
9. Take backups, ed & bd daily, bc fortnightly.
10. Do not remove Integrated Protection Module (IPM's) from the MDF for working numbers. All IPMs should be properly grounded.
11. Modify the system parameter min-subdials to a value less than the exchange digit length/smallest route length whichever is less. If exchange digit length is 5 and one route length is 4. Then this parameters should be made 3. The crp command is mod-sys-param: min-subdials, 3; in this case.
12. It is advised, not to put more than 40 TEN's in a TGP. If it is required to have more than 40 trks in a direction then associate 2 or more TGP's, with alternate choice in TGP-CHC parameter of the route.

13. While taking traffic reports related to trunks & routes, the entry against parameter MOD-NO should be 'AM'.
14. While changing any TUI card, proper jumper settings should be ensured.
15. While changing any CPU card in BM, CM & AP, the jumper settings and EPROM status should be ensured.
16. Inverters should be grounded to exchange earth and not to the AC earth. 3 Pin supply should be provided to the VDU terminals.
17. At the time of changing any controller card from some other site, correct Software version of the PROMs should be ensured before jacking the card into the system.
18. Avoid initialising the system to 'Part-init' level or above as far as possible. This will cause all the subs having 'Sub-OG-BARR' facility to get locked. Of Course, subscriber can open their locks using dynamic STD level.

Chapter 7.

Problems Reported During C-DOT Workshops

7.1. PROBLEMS RELATED TO SBM/MBM EXCHANGES

C-DOT workshops were conducted at various places. The sessions were well attended and quite interactive. Many problems / requirements were reported by the participants. These problems with comments/solution from C-DOT are being reproduced here to propagate it to the gross root users.

7.1.1 IOP Related Problems

SL. NO	PROBLEMS	REMARKS
1.	When IOPs are brought to DUPLEX i.e. while synchronisation of IOPs is done, sometimes sync abort will take place. Reason for sync abortion is not known. How to know the reason and how to proceed further ?	Refer Annexure No. 8.
2.	IOP goes OOS-SYS, when ED/BD Back up is taken.	i) Cartridge itself may be faulty ii) In case of new cartridge, give IOP 5x>> \$TAPE
3.	Sometimes copy-out is possible but copy-in fails for the same cartridge.	This situation is possible because of compatibility problem of the cartridge drive. So it is advised that once a week back up taken on one IOP should be read on the other IOP using CRP command displ-tape-info.
4.	IOP(VL) in Duplex mode for 2 days and again one of IOP go out of service and again by rebooting it again came back into INS-SBY.	Improved in 5.43 software version.
5.	Some times on display few lines are coming as follows: trans etln-seq(25) !	Delete transaction files. If not able to delete contact C-DOT.
6.	Sometimes we see drive no. slice no. so please give detail information about drive No. and slice no.	Refer Application note on Hard disk formatting/IOP User Manual, Contact C-DOT for copy.

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

SL. NO	PROBLEMS	REMARKS
7.	Why disk space goes below minimum space. What precautions to be taken to avoid this. When free space becomes 0, the console will not accept any command and we have to reboot the system.	Free disk space checking is a part of IOP Maintenance procedure. In order to avoid such situation, Disk cleaning should be done regularly.
8.	In /u the free blocks become '0' sometimes. After rebooting the blocks are raising. This problem is not there after formatting Winchester 0 in IOP-1. If it occurs again which are the blocks to be deleted in which directory and in which files.	Some processes are repeatedly created. When it happens again C-DOT may be contacted. In normal course, 'cre-space' utility and other disk cleaning methods will take care of this.
9.	In 1.2GB also, only 720 MB is going to be utilised why ?	More than this, any way, space is not required. In next Unix version full space will be utilised.
10.	In on line mode Shell command given. Core dump takes place.	These commands are UNIX commands which are meant for individual IOP only and hence are to be given in growth mode only.
11.	Frequent display as “medium error on drive 4 slice 0” was shown in the console. Again when rebooted, drive 4 was not shown. Hard disk from one spare IOP was changed.” Within 2 days the same problem repeated and original hard disk was changed. The declared faulty hard disk was found to be ok at another site. All occurred within 10 days.	VDE card may be faulty.
12.	IOP is going to disbl-upd-opr or disbl-upd- All at times.	Solved in 5.43 S/W.
13.	Morning alarm failing frequently and only restoring after deleting and recreating.	Solved in 5.43 S/W.
14.	If the operator terminals (main +RSU) are connected on IOP frequently, the IOP starts hanging. This problem is being solved by bringing the IOP to warm-start-level from power off state and then synchronising with the active IOP. If another RSUs are added IOP hanging problem appears again.	Reload complete software again. Operator terminals and accounts have to be added again with desired permissions.
15.	After changing the status of a switch unit using SBYUPD command when the IOP is in warm-start level, the status is not getting effected when the IOP is brought in service. I.e. modification is not being done.	Modification will be effected after the initialisation of the system upto part-init level.

SL. NO	PROBLEMS	REMARKS
16.	Getting display of uncorrectable error in data field drive-0, slice-1. At this stage if some commands (i.e. mod-lin-sta, del-sub, cre-sub etc.) given then we are getting no acknowledgement from mate CEP. Above commands not accessed on both IOPs-IOP-0 & IOP-1)	Hard disk problem. Hard disk can be formatted with the existing bad blocks or the new bad block can be added to the existing list. There after complete loading of S/W can be done.
17.	IOH files are not getting deleted in one IOP.	For solution contact C-DOT.
18.	If a particular TC slot made OOS and INS, the subscribers std facility locked. Then we have to withdraw (WTD) the sub-facility. Version is 5.23.	Solved in S/W version 5.43. The unit being tested may be faulty.
19.	msg read, free poolnull (continuous message)	Shut down /Re boot IOP.
20.	Copy out → executed but displ-tap-info says it is not in proper format.	Cartridge / Cartridge Tape Drive problem. Replace it and try again
21.	Login prompt not coming on any of the three terminals connected to IOP-0 on ports 3, 4 & 5, when terminals are added using 'add-trm' command, error message comes "Terminal already existing".	First the particular terminal has to be deleted, using 'del-trm' command and then created by 'add-trm' command. Check the SIO (IOP-L) and VDE (IOP-VL) card.
22.	Hard Disk of one station going frequently faulty. What can be the reason?	Most potential enemies of hard disks are irregular power supply and high room temperature. Another probable reason is frequent resetting of IOP, without graceful shutdown. If we can take care of these things, hard disks will remain stable.
23.	Floppy drives & cartridge drives becoming faulty.	Irregular Power supply, dust in switch room and bad air-conditioning, may cause floppy/ cartridge drives to go faulty.
24.	Some time IOP not coming out of IOP5X> prompt, as error comes control 'D' not found.	In this case give 'exit' to come out of IOP5X> IOP5X> exit Then console login will appear.
25.	Both the IOPs work alright in simplex mode, but do not come in duplex mode. During duplexing, synchronisation gets aborted, after message "IOPs are in Duplex". Traffic files have been deleted.	This is the case of sync_abort in step 5, in which all the detail bill & traffic files are transferred. To solve the problem refer Annexure – 8, para 7.
26.	The only working IOP is not accepting any commands, rather only cursor is there on the video screen of console terminal. There seems to be no alternative but to give reset again. Is it correct?	Before giving reset, the console cable can be shifted to SL2 or SL4 link. Then login prompt should appear on the screen. Once login appears, one can enter admin account and do the required work on IOP. However, IOP has to be shutdown and then rebooted through console

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

SL. NO	PROBLEMS	REMARKS
		again. Repeated reset to IOP, may cause corruption of Hard Disk. Root cause of this fault (hanging of IOP) should be detected and rectified. In some cases, IOC or VCP card may be faulty.
27.	In MBM-2K C-DOT, some times subscribers are not able to change their keywords. What is the remedy?	Normally, this problem is reported where old type M/L IOPs are working in MAX exchange. When this problem is reported by subscribers, it will be best to shutdown both IOPs and reboot again to bring them INS ACT/SBY. Ultimate aim should be to replace M/L IOP with VL IOP.
28.	When interchange command is given for 'AP', critical alarm is raised for IOP and both IOP become OOS-SYS. None of the IOP, becomes active again. Only when reset of AP-0 (active) is given, then IOP becomes active.	For all the probable reasons refer Annexure – 9.
29.	One of the IOPs goes OOS-SYS after 4 to 5 hours working.	Most likely, the fault is with HDL card (in case of M/L IOP) in one of the IOP. So observe after replacing HDL card in SBY-IOP first and then in ACT-IOP. In case of VL-IOP fault may be in VDE card of one of the IOP.
30.	By mistake, IOP ID has been given same for both IOPs. How to change IOP ID, without loading S/W again?	Login into root account. # cd /usr/cdot # SETIOPID IOP ID (0/1)? : 1 (say) # cd / # shutdown 0 Then reboot the IOP to warm start. New ID will appear.
31.	Free Disk space decreases frequently in ' / ' directory in IOP M/L or V/L.	Do following in the concerned IOP. - -IOP5X> cd /usr/spool/lp - IOP5X>>log - IOP5X>>oldlog If disk free space, does not increase, then make this IOP INS-SBY. Then bring it to warm-start & cold-start level. Reboot to warm start and bring it in Duplex.

SL. NO	PROBLEMS	REMARKS
32.	OOD terminal not working OK even after killing existing 'PID' of 'AOOD' seen through 'ps -ef' command.	- Check VDU terminal functioning, by putting it on console. - If VDU & cable is OK and 'AOOD' process has been recreated, then fault is most likely with 'SIO' card in IOP-L/M or VDE card in IOP-V/L. These cards can be changed in power off mode and IOP may be rebooted to make it INS-ACT.
33.	Printing of meter reading for more than 100 subscribers not possible at a time.	In S/W release 1_4_1_3, modification for printer cable has to be done. After doing this, it is possible to take printout for all the subscribers.
34.	When interchange to IOP is given, one of the IOPs goes OOS-SYS.	Refer Annexure – 9.
35.	Noise is observed in TWT trunks while changing the SS plane.	Either TSC/SSM/SSS may be faulty.
36.	In TST-TRM que-position showing as '255' but result coming. Why que is shown as '255'.	This is a dummy number so ignore it till IOP working fine.
37.	Not possible to take list of subscribers who comes under NO-ORG sub-facility. In displ-sub-list, org-fac, option no.1 is NO-ORG. But we give that option system displays all subscribers of the BM. NO-ORG option not provided in RGEN SUB FAC.	Solved in 1_4_5.43_3 s/w

7.1.2 Hardware Related Problems

SL. NO	PROBLEMS	REMARKS
38.	Terminal/Test Card (TTC) become faulty often in SBM.	It happens due to non release of TA relay in LCC card. First identify the Terminal Unit and then particular LCC card by removing the TA cables. Now replace that LCC card or Jackout and Jack in of the same card may also help.
39.	Speech quality and chattering noise on all the subscriber of a TU when copy -0 is active.	Site specific, H/W related the possible faults may be SPC card Particular terminal card Mother Board of TU

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

SL. NO	PROBLEMS	REMARKS
40.	Sometimes one TUI card works in a particular frame and does not work in other frame	This is observed sometimes due to transient faults or in a particular case, TUI card may work at the 4 th place of concentration but may fail at any other place. Check jumper setting as per position.
41.	MU in BM literature is not clear even during failure, the diagnostic shows OK	Swap memory cards Conduct DGN for card. Otherwise do dgn by replacing individual mem cards. Refer Annexure-12.
42.	In case of power supply failure or flicks i.e. when F.R is switched on. PSU-2 cards of CM goes faulty and critical alarm is observed.	PSU II child card ECN should be implemented at few sites. For details contact C-DOT.
43.	When we are putting one copy of TIC (TI12-1) inservice chattering starts. We changed all three cards (TUI, SPC & TIC) but same result comes. We removed all line cards in that frame and then put that TIC copy inservice but no change.	There may be problem in TU motherboard.
44.	One way speech trouble. If we give dgn-sw for TIC, it give ok report. But we will get one way speech trouble in some slots of same TU. If we change TUI or TIC or SPC the problem will be solved. In such cases why dgn is not failing ?	TIC fault only, DGN will not test all links.
45.	Individually, SS-0, SS-1, IFCs and CMSs diagnosed okay. But in one plane, in one of the BM (1:4 conc), between TU7 and 8 observed one way speech. The TICs are diagnosed ok. The probability of fault may be analysed.	TIC7/TIC8 card to be replaced.
46.	A flow chart for tracing fault in CM for inter BM call failure and one way speech. Ring not passing but on lifting conversation okay.	Refer Maintenance Procedure Document for fault-tracing.
47.	Getting muffled speech, (some times one way speech) irrespective of subs. Nos. DGN pass-report, while diagnosing the TICs individually.	TIC/TUI card problem. Replace these cards.
48.	In Pattukottai SBM-1, TIC16 & TIC13 of '1' copies are always in OOS.SYS. Unable to bring INS. If we try for INS, after certain period, it become OOS.SYS. DGN was done for the cards, which is ok. What is the problem ? How to put them INS?	Try by replacing active TIC cards.
49.	When TSC-0 is active Ti06, Ti07, Ti08 (0) are getting inservice standby. But if they are made as active, above said Ti going OOS-SYS. But as TSC-1 active Ti106, Ti107, Ti108 are going OOS-SYS. Dgn-SWU for TSC-0, TSC-1 is OK Dgn-Swu for Ti-on TSC-0 active passed. But on TSC-1 is failed.	TSM/TSI of TSC-1 to be replaced. Check TUI of TIC05-0.

SL. NO	PROBLEMS	REMARKS
50.	In Mundakayam SBM (5.23V), TIC concentration Ti 13,14,15,16. Ti13-0 OOS EXT. When we diagonalise Ti 14-0, 15-0, 16-0, it failed. We changed with ok cards. Again failing. After so many trials, we just made Ti 13-0. OOS-OPR, and diagnosed. It was ok. Then we diagnosed other three and found ok. What can be the reason ?	It is essential to make BM TIC OOS i.e. TI01, TI05, TI09 & TI13 should be OOS-OPR, before diagnosing the concentration TICs.
51.	TUC card in TU-1 of LM2 with TIC ids TI02-0 and 1. TI02-0 is INS. TI02-1-dgn is ok but going to OOS-SYS changed cards but same report.	Try replacing act TUC.
52.	It is observed that suddenly the exchange will go down, after about 100 seconds the load pass report will come as SOFT START, Error: Data comparison in RW area. At this time no alarms will be there on ADP. Diagnostic report is taken on MU0 & MU1 it is ok. So what may be the problem? & what is the solution for this ?	Transient problem. Try replacing BIC, BID or MEM cards one by one.
53.	One BM RSU is working with 4 PCMs ICs in RTS cards getting faulty after some period. Even IC chips are faulty PCM status getting INS ok but complaint receiving getting parking tone. The only way to put right the PCM by trial and error by putting the ok IC chips in RTS card.	73321 driver chip at position going bad if it is through cable PCM.
54.	Ring is not extended to the subscribers in one of the subracks in LM.	PSU corresponding to active TIC is faulty.
55.	After diagnosis of TI05-0 okayed report is getting. After making TI05-0 to INS-SBY and then to INS-ACT, all directory nos. in this frame goes to OOS-SE.	SPC card of Ti05-0 is faulty (Although DGN is OK). Replace the card.
56.	If TI13-1 when made ins-act, all DTKs become OOS-SE (BM4)	Check TUC card of Ti13-1
57.	CMS3 & CMS4 go OOS-SYS often. If both CMS3 & CMS4 goes to suspect at a time and becomes normal after some time, the lamp on ADP remains red for CM.	Two CMSs going OOS-SUS, will create Critical Alarm. Change MSC & MSD cards.
58.	In 1.4K SBM, one green lamp glowing on ADP "displ-sys-all" command shows all units INS/SBY.	a) Most likely, the lamp is due to pending power alarm of a TIC. Note down TIC No. from 'displ-arm-list' command for which power alarm is shown. Then switch off/on the relevant 'PSU' with clear the alarm. b) In case, alarm is still not clearing, then change 'PSU' corresponding to TIC, otherwise change Active copy of TIC card.

SL. NO	PROBLEMS	REMARKS
		c) May be due to threshold alarms for MFC. So force out & force-INS, all the MFC one by one.
59.	Testing of digital circuits are on stream basis and when individual port is faulty, the diagnostic (TST-DTK) does not show any faulty port. Facility should be there to locate individual channel faulty.	Individual port testing can be done by using 'DBE' facility. Normally, if PCM test is ok, individual ports cannot be faulty.
60.	Whenever any PSU fails in 'TU' it is very difficult to locate fault, because by appearance, all indications on PSU are O.K.	Replacing PSU, by perception is the only remedy by now as PSU is not covered by any DGN.
61.	One TIC is not coming INS. Diagnostic OK with both TSCs. What can be the reason?	Once diagnostics with both TSCs have passed, only possibility is of TIC card (either active copy or OOS-copy) faulty. The fault being "watch Dog Signal failing between two TICs". Fault should disappear by changing one of the TICs. Otherwise, fault is in TU motherboard
62.	TIC diagnostic fails in particular slot with both TSCs, while same TIC works in other slot.	TUI card, in the upper TU may be faulty, or concentration cable between upper TUI and this TUI are bad. In some cases ACT TIC may be faulty.
63.	TIC comes in service, but goes 'OOS-SYS' after some times. Diagnostics OK with both TSCs.	This type of observation is caused by noise in the links. In such a case, self or upper TUI can be bad or concentration cable between upper TUI & this TUI, are causing transient noise fault. So replacing TUIs or concentration cables will settle the fault.
64.	BP works on standby mode, but if put on active mode it comes OOS-SYS. Diagnosis OK with both BMS.	For BP diagnosis, BMS does not come into picture. In such a case following possibilities are there a) SBY BP, is having different S/W EPROMs. b) SBY BPs links are not OK with active BMS. c) SBY BPs links are not OK with memory. Problem can be solved by i) Changing CPU card ii) Changing BIC card of SBY-BP iii) Changing BID card of the self Memory Unit iv) Interchange ACT-BMS unit.
65.	Power alarm for PSU corresponding to some TIC is not disappearing, despite change of PSU.	Fault may be in TIC card itself, which is unable to detect PSU presence. In such cases, TIC card itself is bad and needs replacement.

SL. NO	PROBLEMS	REMARKS
66.	Diagnostic of TIC is OK, but ring is not tripping.	As SPC diagnostic is not fully covered, during TIC diagnostic, No-ring trip fault can be due to ACT-SPC fault. In this case changing SPC card, rectifies the fault.
67.	Auto Ring test by dialling '162' is failing.	TTC in the particular BM is faulty for '162' purpose. TTC may remain INS-ACT status despite this fault.

7.1.3 Billing Related Problems

SL. NO	PROBLEMS	REMARKS
68.	i) Detail Bill not available from certain date onward. ii) When, meter reading is taken through "Report-Bill-Cntr" it is showing old meter reading, while reading is OK through 'Displ-Sub-Mtr'.	i) Recreate 'isp' process IOP 5x> ps -ef grep isp It will display : root xxx[isp] IOP5X>kill -9 xxx Now message should come : Recreating, ...[isp] Give 'Return' to get IOP5x> Now Detail Bill will start generating. ii) Give soft start to system using crp command <init-sys :, softstart; After 2 Hrs verify meter reading in IOP, using 'fmt-blg-cntr' & 'Report-bill-cntrs'.
69.	In NCBR (Detailed bill record) false metering pulses are encountered	Media fault. Taken care in 1_4_5.43_3 s/w link, for MF routs only.
70.	There are some cases observed (by seeing the detailed bills of STD/ISD) in which the bulk meter reading is not matching with the actual printout given for the period by command displ.bill.rec i.e. the STD/ISD is showing very very less as compared to bulk.mter.	Bulk counter records total of STD counter & Local counter. Total meter reading as seen through 'displ-bill-record' should match with std-counter.
71.	While giving 'Report-bill-cntrs' it is not possible to get all numbers print out. At a stretch only 200 nos. are getting. Some numbers are found missing.	Formatted file may not be available or printer ECN to be verified.
72.	Diversion of call coming in ncbr report for nos. without giving any facility to these nos.	It cannot happen.
73.	Metering on dialling by equipment no. is not taking place even after version changed to 1_4.	Metering is valid for 'PRD-TAX' routs only.

SL. NO	PROBLEMS	REMARKS
74.	After the installation of MBM at Kollegal we are unable to receive the Billing data and process the same at o/o GM Telecom. If you change the S/W program at centralised Billing for MBM it may not work for SBM	The package used in billing centre to be modified. Update SBM to 1_4.
75.	BC backup of S/W release 5.23 or 5.43 can not be processed at TRA Centre and details bill are not getting generated.	There is structure change in detail bill files, required for processing. So acquire new structure from C-DOT, to make the package compatible for P5.23/P5.43 also.

7.1.4 System Initialisation / Overload Related Problems

SL. NO	PROBLEMS	REMARKS
76.	System going for frequent initialisation at level 'SBL-CLR' with reason 'Software Counter Over Flow'.	Refer Annexure 4.
77.	Message Buffer overload has been observed at some sites.	Overload control strategy has been modified to take care of overload problem in the new S/W release 1_4.
78.	MLF report with reasons "Data Comparison Error in R/W Area".	This is because of transient fault in some memory card. The C-log utility can be run to identify which card is creating problem. However these problems have been taken care of in the new phase of hardware (16MB TME Card). Help can be sought from control room to identify the card if c-log utility is not available.
79.	Problem of over loading of exchange are observed if DTMF facility is given to more than 200 subscribers.	Observation is not correct, M/F tone dialling facility can be given to all subscriber in the exchange. However it is advised if this facility is given to subscribers they should be advised to use it, otherwise it may lead to overload problem.
80.	Trunk BM is getting over load during busy hour.	Refer Annexure - 2.
81.	In case of overload, DT disappears for 10-15 minutes STD dynamic locked automatically if subs. are not using this	In case of overload system may go for initialisation with level stable-clear. CPU manual reset during this situation will cause system to go for code load, which will cause STD locking. So avoid giving code Load/Part-init as far as possible
82.	Automatic withdrawn of STD facility when any software or momentary problem will occur in any BM(for those subscriber who never lock their STD)	System initialisation with part unit or above causes STD locking for security reasons. Subscriber should be educated to unlock STD, using their secret password.
83.	Delayed dial tone in particular concentration	Enable switch-network Traffic report & check

SL. NO	PROBLEMS	REMARKS
	frame.	for congestion.
84.	Analog inter-dialling circuits (both O/G & I/C circuits) become “one way speech” after any PCM failure and restoration or Trunk BM going for stable clear. Not all the circuits affected, but about 50% of circuits go one way speech. The circuits are in different TUs and in different cards. When the TENs are deleted and added again, the circuits became normal.	Known problem. Del/create of the Trks/TGPs is the only solution, permanent solution will be provided later.
85.	MLF frequently occurs for duration of 2 to 3 minutes. Exchange fails.	Refer Annexure 7 & 4
86.	Subscriber was able to get dial tone only after tapping few times. Actually out of 8 tapping dial tone was available for 3 times. Soft-start was given and found OK.	Dial tone delay. Look for any message on ood, Report to CDOT.
87.	Due to one trunk port fault, exchange fails	Trunk port data is corrupted. Trk to be deleted and added again.
88.	Some times reloading does not start automatically for a particular BM in an MBM exchange.	Refer Annexure – 10.

7.1.5 Networking/Media Related Problems

SL. NO	PROBLEMS	REMARKS
89.	When a particular number is under malicious call observation, Incoming STD calls from network don't mature. This defect is noticed in routes having MF signalling. No problem in Dec-routes.	Earlier this problem was there due to E10B TAX not supporting ANI signal. Now this problem has solved due to upgradation of E10B software. When signalling is Decadic, then ANI will not be asked at all. So calls are OK. Solved in S/W 5.43.
90.	One minute disconnection of calls during which speech and transmission is in correct manner.	Reversal Not received. Check for answer condition at media point.
91.	Whenever PCM is going to OOS-TRANS and when the PCM is right, the O/G jns are not becoming OK by automatic. We have to make OOS-OPR and OOS-INS. In the above condition calls on this route are getting parking tone.	Solved in 5.43. OOS-TRANS JNS will be restored to INS-NRML after 20 minutes, if media becomes OK.
92.	Digital trunk goes OOS-trans. alarm in ADP or on OOD after media becomes ok.	Self restoring after media becomes ok, in S/W version 1_4_5.43_3.

SL. NO	PROBLEMS	REMARKS
93.	If a no. is kept under obs for malicious calls level a) I/C calls from other electromec exchange will be effective. a) I/C calls from x'bar exchanges get disconnected immediately	Signalling problem. CLI not supported properly in X-bar exchanges.

7.1.6 Lightning Related Problems

Sl. No.	PROBLEMS	SOLUTIONS / GET-AROUNDS
94.	Many MDF fuses blow up due to lightning and sometimes Components in the LCC cards are also getting faulty.	The probability of damages can be reduced by ensuring: ◆ Proper earthing of MDFs through collector plate by using 10 mm ² black earth cable. ◆ Integrated Protection Module (IPM) recommended by C-DOT should be installed at MDF ◆ Ensure that IPMs make proper contact with earth strip provided beneath it. ◆ Make sure that at no point AC earth and DC earth are common. Say at inverter or power cabinet.
95.	SBM (8.9) Due to lightening during the monsoon particularly PSU, TIC, LCC, SPC, TUI, MEM, BID, PSUIII cards are affected. The exchange earth resistance is less than 1 Ω - (i.e. 0.7 Ω). The protective devices are not acting during lightening. In the same area 512ILT exchange is not affecting due to lightening.	Following steps may be followed: 1 All LSA modules should have earth strips. 2. MDF is properly grounded. 3. IPMs are inserted properly and making contact with earth strips. 4. Wedge the line on exchange side before removing IPM when such fault is reported.
96.	What are the precautions we have to take when SBM exchange located near by 132KV sub station area	Earth resistance should be <1 Ω . Provide IPMs in MDF. For inverter grounding refer annexure-16.
97.	During lightning, it is observed that both IOPs are coming to IOP 2.5. Normally we are able to boot and restore IOPs. On 4 th Nov.97, both IOPs failed. IOP-1 brought in service. IOP-0 when given 'bo' halted at RMAN DRIVER and not proceeding further. Changed IOC card and no effect.	Check up inverter 3 rd pin. Not to be extended to terminal and printers. Checkup PER card. Refer Annexure 16 for implementation.

7.1.7 Data Inconsistency/Data Creation Related Problems

SL. NO	PROBLEMS	REMARKS
98.	From STD PT subs provided on CCM card, metering information is sent to subs office even for non-metered sp1 service calls (197, 198); but those calls are not metered at the exchange directory number.	197 and 198 are created as special routes, with calls made to land on some alternate directory numbers. While creating these directory numbers it should be ensured that field MTR-CLS is created with NO-MTR information It is a data creation problem.
99.	Sometimes subs lines goes to Ad-busy or PREC-N status on its own. Only part-init helps to restore the sub's line. This may be taken care of in future software releases.	The line goes in PREC N. status during creation of subs if both copies of the TICs of that concerned TU are OOS. Please make sure that while creating the sub in a TU the TICs must be inservice.
100.	A TEN was free but a subscriber could not be created.	This is due to data inconsistency in both IOPs. To solve the problem, it is to be tried out in growth mode in both IOPs one by one. If it is successful in any one of the IOPs, the other IOP is to be brought to WARM-START-LEVEL and the system is to be initialised to PI level. Once the system comes up, the other IOP can be synchronised. If the problem is not solved contact C-DOT Control Room.
101.	On IOP-0, one directory number deleted for restoring the STD facility. But when Unfrz-GVN.Dirno. command given error report appears as number not in frozen list. For Displ-Sub command, error report appears as number not assigned. On IOP-1, Displ-sub, command shows the display of this tel. no. but for DEL-sub command error report appears as number not assigned. How to restore this no.?	In IOP-1, in CRP prompt give commands - CHMOD:2; DEL-SUB: DIR-NO.; CHMOD:1; UNFRZ-GVN-DIRNO & then CRE-SUB again in ON-LINE mode
102.	DIR Number shown as a part of Hunt group. But actually not in Hunt group. No. could not be deleted and is unusable.	Data inconsistency. For correcting using datpat contact C-DOT.
103.	203 test could not be done for trunk terminals.	Answering circuit no. of distant exchange is to be filled in OG TGP against ANS-INFO parameter.
104.	Suddenly in one route, one sec. Pulse received. Solved by changing tgp category.	Data to be created properly. With proper category and charge rate number.
105.	When a STD phone locked and 'mod-sub-char' given to change the access barr to local not functioning. Data showing up-to-local but subs getting STD.	SUB-OG-BAR facility is to be withdrawn first and then only Acc-Barring is to be modified to OG-UPTO-LOCAL.

SL. NO	PROBLEMS	REMARKS
106.	TAX calls failure due to non availability of trunks even when all trunks are free. We have tried by recreating the TGP and route. But the problem solved only after giving INIT-SYS with part-init.	TGP data corruption. Problem solved in 5.43 version.
107.	Problem in switching in DID route for ILT route working. There are three DID routes i.e. 22xxx, 23xxx and 24xxx the levels of which are being supported by the strowger exchange. The strowger exchange is working in tandem with MBM exchange. When the subscriber dials any one of the above routes, he is getting held up and the switching is not taking place. MBM exchange codes are 25xxx, 26xxx, 27xxx.	Make system parameter, Routing = 5.
108.	One working number went out of service system side. Given delete command, not deleted. On re-creation, no. could not be created on the same TEN. Reports TEN already assigned. No. created with another TEN. It is working ok. But meter reading is on two TENs increment is only in new TEN.	Data inconsistencies has occurred. To correct it using datpat contact C-DOT.
109.	Sometimes particular subscriber parameter gets locked and modification to subscriber is not possible. How to solve it?	This can be done through DATPAT with the help of C-DOT.
110.	Some times garbled announcements start coming in the system.	- Check type of announcement being used from check sum of language EPROMs' provided in ANNC card. - Copy the relevant announcement files into \$GLBDATAP directory, from \$ PRCDATAP directory - Give 'part-init' to system or the affected BM.
111.	How to unequip a BM in MBM exchange?	Not possible to unequip a module. Old Ed can be copied, which does not contain that BM. Else contact C-DOT.
112.	During addition of a BM in a working MBM exchange, some times equippage of new BM fails with message "inconsistency between two files".	Yes, it is possible if it has been done on line & in busy hour. If this activity is performed during late night in absolutely low traffic hours, it will be successful, provided correct procedure is followed. It is advisable to follow all the steps mentioned in Application Notes on Expansion of C-DOT MAX-L exchange.
113.	While creating a route by CRE-ROUTE command, error is coming as "can't write in the file".	Refer Annexure – 3 for solving route related problems.
114.	When subscriber is created, the port comes	These can be following possible faults :-

SL. NO	PROBLEMS	REMARKS
	OOS-SE and can be brought ins only by frc-trm-oos/ins. Some is true for creating of TGP.	1. TTC is INS-ACT , but Test Access cable from TTC is not through to the TU which no. TGP is created. 2. Test access bus is not through in that slot due to active TIC fault. Interchange TIC will solve the problem. Therefore it becomes necessary to ensure that "TST-TRM" is successful in all the TUs & then create the subscribers. Otherwise keep 'TTC' oos-opr, while subscriber creation or TGP creation.
115.	Finding some problem when TRK TU is concentrated with local nos. in LM2.	When concentration done with Trunk TU, less No. of Time slots will be available for subscribers in concentration. Reduce No. of subs or Trunks.

7.1.8 General Maintenance and Utility Related Problems

SL. NO	PROBLEMS	REMARKS
116.	Alarm on OOD and ADP hangs. Though there is no alarm in the exchange.	Take the following steps 1. Run Audit Set 12 2. Put ADP OOS and then INS 3. If the alarm is still persisting, then put the unit for which the alarm is pending, out of service and then inservice. If the alarm is still persisting, follow the procedure enclosed in the Annexure-5.
117.	Automatic Routine testing of Subscriber's line and Trunk is not possible by "Calendar Management".	Will be Taken care in next software release.
118.	Announcement of Kunda's Exchange (SBM ver. 5.23) Sentences are incomplete	Announcement EPROM may be bad or reloading of Announcement file required. Contact C-DOT
119.	Without granting STD facility STD is getting for 3 nos. in a slot. For that replaced card (LCC). TIC etc., but no use. What is to be done?	These Nos. must be having Dynamic-STD facility earlier. So withdraw 'Sub-Og-Barr' from these Nos.
120.	TWT ports getting blocked/faulty and becomes NDT, whenever, we break/isolate lines on MDF or on Trunk lines for lineman testing, change of jumpers etc., In this case we delete the circuits and add again.	For O/G trunks, first put the trunks OOS-OPR before wedging at MDF
121.	Some dir no. gone to INSF-AD-BSY when made out and IN then also no success. By changing	Using 'mod-lin-sta' command, make these Nos. 'temp-oos' & then 'Ins-nrml' again.

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

SL. NO	PROBLEMS	REMARKS
	TEN also, the dial tone on the TEN goes off. If new no. is created, the OMR is that of previous tel. no. resides. By Changing LCC also no progress. What happened to the port?	'temp-oos' & then 'Ins-nrml' again.
122.	Alarm for LLO trunk creates frequent alarm for a I/C TGP with 3 trunks. (both in ADP & OOD).	Small TGP, Med TGP & Large TGP threshold to be changed. (Refer problem No. 153)
123.	Any recorded announcement can be given while changing the numbers.	It is not supported at the moment.
124.	In Trunk Traffic information the effective calls are more than the total calls in some jns.	Some of the calls originated in previous report period are getting completed in current report period.
125.	Using Rgen.Trkcdr command, all calls could not be seen. After some records, mutilated reports displayed.	Rgen to be reloaded, corruption may be there.
126.	After tgp observation for 3 hours only first one hour obsn is displayed. After that only some mutilated reports got.	New rgen to be loaded.
127.	Whether there is any restrictions for putting TGP's under observation.	Refer Annexure 14 for present S/W release.
128.	Observation of TGP's and trunks (individual). CDOT information : obsn in multiple of four. Result : TGP observation rpt ok. But individual trk rpt not coming when trk CDR command given in RGEN.	This option has been removed in RGEN. Now for one TGP it is possible.
129.	Frequent failure of auto alarm facility to subs. The facility is restoring after deleting and creating the sub	Solved in 5.43 software.
130.	EMF trunk junctions (both ways) observed one way speech locally. After landing in that particular junction the speech is restoring.	Problem is under CDOT observation.
131.	Call transfer facility to pager and cellular phones is not working.	As per the TEC spec. it is not provided in 5.43 S/W.
132.	Call waiting facility is not 100% success. After change over, one party is getting disconnected in more than half of the cases.	After 5.43 retrofit it could not be simulated at site, further feedbacks may be given.
133.	While testing the local lines by giving 'TST-TRM' the result after testing are being shown as -ve values for the tests - insulation of A limb with gnd, Insulation of B limb with gnd, Insulation with A&B cross. The same TTC is working ok in other BM. Even if we change the TTC by good one, it is not testing the any sub line of the BM.	One of the line card has low insulation. To be isolated by removing TA cable.

SL. NO	PROBLEMS	REMARKS
134.	In rgen sub utilities in the parameter dir.no. it is better if '&' option or 'from.....to' is introduced, instead of a single no. or a continuous set of nos.	Blocks of 10 nos, 100 nos. 1000 nos. can be used. Utility has limitations and from-to option cannot be provided.
135.	Incoming traffic in all directions showing very low. We have physically verified incoming traffic and calls are effected well but it is not recorded as actual figures other end o/g traffic efficiency in same circuits is greater than our incoming traffic.	There are some problems in traffic reporting. These will be taken care in next software release.
136.	ISAM error- is rewrite 0 x 6f, 0x22 continuously rolling on the screen on active IOP. If the IOPs are interchanged, the same problem appears in active IOP.	First give part-init to Trk BM. If not solved, then give, part-init to AM, using init-mod command.
137.	Self ring '162' not working. Only engage tone coming when tried for '162'	Check whether 'TTC's is INS-ACT and TA bus cable is properly connected.
138.	In call waiting facility the 1 st party is disconnected when the 2 nd party is on line when tapped the hook switch.	Hook switch timing may not be proper. Try using flash switch.
139.	If the STD code of a station is 5 digits, while creating o/g TAX TGP, it is not possible to give AC-INFO, as there is provision for only 7 digits. Ex. 08818161 (8 digits).	To be verified.
140.	While using DATPAT for viewing temporary out of service numbers using the file 'iotosd' no record for the key value is showing even though the given DIR-NO is in TOS status.	DATPAT to be used only with Control Room Assistance.
141.	When a trunk port is in "INSF-LLO" status, it is not coming to INSF-FREE even after the trunk got rectified.	Force out and force in.
142.	Cannot make the ACC-BARR as OG-NOT-ALLD and IC-BARR. To subscriber simultaneously in 5.23V. Normally safe custody subscribers we cannot delete/sub. We were normally kept these subscribers as OG & I/C Barr in 8.9V.	Problem solved in 5.43.
143.	Not possible to change time status from BNP-ANNC to NRM-LIN directly. Subs who is under BNP-ANNC. He clears all dues within 15 days. We should be able to change his line status from BNP-ANNC to NRM-LIN directly without going to BNP-DISC.	Solved in 5.43
144.	NCBPRN utility not working i.e not printing, it only displays on screen.	Use new rgen.

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

SL. NO	PROBLEMS	REMARKS
145.	When service code 43 is used telephone goes dead for 1 mt and restores automatically without successfully changing the key word. This happened twice in all the cases. We killed PID for SIF.	SIF related problems have been taken care in 5.43.
146.	Suppose we want to execute rgen ncbr from 0000 hrs (current day), it is showing calls made by subscriber before 0000 hrs also (call made by the subscriber in the period 2300 hrs - 2400 hrs last)	Such calls have originated before 0000 Hrs, but got completed after 0000 Hrs. So these are registered in the next date. This will be corrected in the next S/W Link.
147.	When large no. of LLO subs are there ADP goes out.	Under analysis.
148.	During Software loading, 'audit' report is OK, but if separate audit is taken of 'patch' then it shows list of missing files.	i) Separate audit should not show any files missing, although it may show, few files extra or modified. ii) IOP should be formatted and re-loading of S/W to be done.
149.	Repeated alarms regarding TGP failure on ADP/OOD/printer.	In S/W 1_4_5.43_3, the number of system parameters responsible for raising/clearing TGP alarms have been increased from 3 to 21. Now 7 types of alarm limits are provided for each of the three type of TGP's i.e. Small TGP, Medium TGP & Large TGP. In case the trunk conditions are not controllable, then these limits can be raised for Small & Medium TGP, by modifying system parameters. Value against these parameters indicate % of trunks being faulty.
150.	After formatting the Bill counters, meter reading shown by report bill counter is not current as shown by "display-sub-mtr".	This is as per implementation. At any time, 4 counter files are available in the IOP. During formatting, last but one counter file is formatted. As a result, meter reading given by "report-bill-cntrs" may be older by one to two hours.
151.	In S/W 1_4_5.43_3, whenever a BM is initialised, all the TICs, which are not equipped, appear in the system status.	Problem is already reported from some sites having TME cards & can be corrected with the help of C-DOT.

SL. NO	PROBLEMS	REMARKS
152.	When BP interchange is given in SBM exchange, ADP goes OOS-SUS and recovers.	Problem has been solved by changing ADP-EPROM New checksum = 8CE2
153.	For PSU failure, no alarm indication coming on OOD/Printer. Although alarm is coming on ADP.	- System parameter COD-ALM should have value '1'. - Recreate process 'AOOD', by giving following commands:- IOP5X>ps -ef grep aood Note down value in 2nd column. Next to root, in the display. Root xxx (aood_mai) IOP5X>kill -9 xxx Now process 'aood' will be recreated. Press <Return>.

7.2. INFORMATION RELATED QUESTIONS ON SBM/MBM

7.2.1. IOP Related Questions

Sl. No.	QUESTIONS	COMMENTS
1	Is there any other way to increase the blocks other than tf, trnsf, ioh, bc?	• C-DOT has developed a utility which takes care of deletion of all such files. The utility is 'cre-space'. Run 'Cre-space' on IOP5x> prompt. • Go to CRP and give command ~~del-fgp-file~~ [OPT] = < > [FGP] = tf [From date → To date] Give date options for '3' months at a time. e.g. current Date : 25-3-98 Then start deletion of 'tf' from 26.3.97 onward. Repeat the command till date 24.3.98 is reached.

Sl. No.	QUESTIONS	COMMENTS
		• Shut down and Re-boot the IOP. Blocks may increase by this. • In case you find some difference in free blocks in two IOPs, then do following – In both IOPs give command IOP5x> du / - OR Take print out on printer by following command: IOP5x > du >/dev/icc_0 – Now compare the two lists, to note down the name of directory having different block size. – Enter in the directory having different blocks in both the IOP's unusing 'cd' command. Find out extra files by displaying the contents. (Consult C-DOT control room in case of any doubt.) – Remove these extra files to make the 'df' equal in both IOPs.
2	Sometimes cartridge restoration is not possible due to incompatibility problem.	If restoration is not possible with different cartridges, it may be due to head alignment of the cartridge drive. The cartridge drive is to be replaced. Since IOP-L/M is having 60MB cartridge drive and IOP-VL has 150 MB cartridge drive, therefore cartridges prepared on IOP-VL can be used only in IOP-VL and not in IOP-L/M. But cartridges prepared in IOP-L/M are compatible in both IOP-L/M as well as IOP-VL. Always keep it as a practice after copy-out to read the tape as the other IOP by DISPL-TAPE-INFO command.

Sl. No.	QUESTIONS	COMMENTS
3	When copy-in command is given, the availability of free blocks in the disk is to be checked before copying onto disk.	Disk space can be checked at Unix prompt before loading the cartridge. Give command 'df' on IOP5x> prompt IOP5x>df This will display four lines as shown below : /u (/dev/dsk/m320_0S6) <u>90096</u> blocks 8601 i-nodes /data (/dev/dsk/m320_0S5) <u>172398</u> blocks 102658 i-nodes /code (/dev/dsk/m320_0S1) <u>128686</u> blocks 10254 i-nodes / (/dev/dsk/m320_0S0) <u>6020</u> blocks 7501 i-nodes. The 'blocks' shown under 3rd field denote the free blocks available in the particular directory show under field '1' e.g. from above we can find that 172398 blocks are free in / data directory Note: Above display has been taken from IOP-L/M having single disk of 520 Mb capacity. In case of 70 Mb hard disk, the free disk space shown will be quite less. Ensure that the free space available is more than the block size of the tape to be copied. But the actual requirement may be much less than the Block size of the tape in case of (I) ED, (ii) BC or BD which is already available in the IOP is full or past.
4	In some cases, while reading cartridge, the message “Perhaps -C option should be used”. This message is misleading	Message will be modified in next software release
5	Why the free disk space is different in two IOPs.	It may be because of the following reasons : If IOPs are not in DUPLEX. If disk cleaning is not done in both the IOPs. If certain command files are run, the log file is created in that IOP only.
6	Replacement procedure of 2 Mb memory board to 8 Mb memory board at IOP.	No special replacement procedure of 8 Mb memory card. One 8 Mb memory card can be placed instead of two 2 Mb cards in the slot.
7	Some document required to take care of IOP related problems.	Updated IOP User Manual take care of all such problems.
8	We are going to change the hard disk from 70+70MB to 1.2GB. What is the procedure in	Application Note is available on procedure to replace Hard Disk.

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

Sl. No.	QUESTIONS	COMMENTS
	IOP.	
9	At times when 'cre-space' is used ood, log files get removed instead of nullifying. Whether ood log files are to be deleted (nullified)?	Yes ood log back up is to be kept if required. OOD will get deleted.
10	Whether the o/p of CRP commands can be stored in a file for viewing later (printer abruptly stops at time so command to be given again)	No, O/P of CRP is not stored in a file. Of course a command file of crp can be made for this purpose.
11	Whether one more printer can be connected. If so details may be given.	Only one printer per IOP.
12	At times IOP goes to DISPL-UPDATE-ALL level, when command Mod-Sub-Ten, Mod-Sub-Dir given.	This level of IOP will come only when overloading is there in the system.
13	From any terminal with restricted privileges, the operator can go to 5C or 5D prompt and can do operations.	In addition to the operator password, terminal password can also be used to restrict the operator. In future releases, operators will be going to CRP prompt directly.
14	While loading s/w error comes “get help perhaps - c option to be used.	Cartridge drive or tape problem. It is a read error.
15	In sync operation some message like cannot unlink IO map file.	First time after loading of S/W. For IOP Sync. failure refer Annexure – 8.
16	BC-backup taken in 8.9V IOP cannot be copied on new IOP hard-disk with which Emc-case becomes problem. Whether the following command can be used? cpio -icvud <\$TAPE For restoring data from tape to disk for new version.	Use over-rel option in “copy-in” command and create directory /u/rel1_35/data/dump before copying.
17	Some of the used cartridges (earlier BC taken & kept for one year) cannot be reused for writing present BC-backup.	Nullify the cartridge & use Expiry Over option, while 'copy-out'
18	In IOP-VL how the disk is formatted?	For low level formatting, give command: IOC6.4> fd w0 Ignore “time out” message. For actual formatting, Give 'Y' when system asks “want to format Y/N?” Bad block entry is not required.
19	For IOP-VL, EPROMs in VCP card, has been shown as type 27C4001, in Retrofit document. Whether it is correct or not.	Type 27C4001 is not correct for IOP-VL. It should be 27C010 or 27C020 type. Type 27C4001 is to be used in IOP-VH only.

7.2.2. Utility Related Questions

Sl. No.	QUESTIONS	COMMENTS
20	It should be possible to get the meter readings for a group of numbers (e.g. PCO numbers) through “rgen”.	Utility will be made available soon.
21	Create space utility mentioned in literature, but floppy not available	Provided with RGEN utility.
22	In rgen utility, we are not getting rgen ictgp and rgen ogtgp reports though the tgps are in multiples of four	Use modified version of regen (V7.2)
23	In 5.43 S/W, rgen linchr for NAT is not coming.	Displ-sub-list command to be used or new rgen for 5.43 to be used.
24	Traffic information not getting on rgen for both way tks.	Available through new 'rgen' version 7.2.
25	Latest version 5.23V tape copy is not working.	Rgen version 7.2 to be used.
26	Rgen cdrcld gives calling ten - “called ten” more useful for monitoring o/g ccts performance (through backward signal absent). O/G Ten to be included in the script file.	Use cdrcln for monitoring the O/G trunk performance.
27	Displ-cdr shows timings in hexa which is cryptic & not useful.	Use rgen.
28	When TGP's are kept under observation and trf report is taken from RGEN, garbage data is coming frequently.	Solved in rgen V 7.2.
29	Repeat option in rgen command, required.	Suggestion noted.

7.2.3. System Maintenance & Administration related Questions

Sl. No.	QUESTIONS	COMMENTS
30	Test 203 failing when connected to OCB-283	Protocol at OCB should be set equal to 2WP which is set at CDOT.
31	How to confirm that 16 KHz pulse is being sent to subscriber. Often STD PT complain that they are not receiving 16 KHz pulse.	Check the tone using 16 KHz detection meter or C.R.O.
32	Fault code, card id and fault probability-clear idea of the above may be given in documents.	Fault code & Alarm code can be ignored. The diagnostics report displays the card-id and their probability of fault w.r.t other cards. The higher the probability among the cards the more chances of that card being faulty.
33	Main hunt group member, character, status etc. are not displayed and are not able to modify their facility. It has to be deleted and recreated.	Solved in next software release.

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

Sl. No.	QUESTIONS	COMMENTS
34	No separate arrangement for testing the terminal card. Every time eight circuits have to be put-oos for removing one card to test another card using this slot.	Line can be tested by making OOS. However it is not possible to test a line card without assigning directory number. Facility will be provided in the next release.
35	In the malicious call observation report, zeros are added alongwith numbers.	This is not a problem. It is the implementation as desired by DOT. However extra zeros are to be ignored.
36	Sometimes card-id given by diagnostics report are not correct for BMs.	Limitation of Diagnostics in certain cases.
37	Only last two ports of CCM can be used for 16KHz metering pulse.	It is a constraint at present.
38	How to calculate the requirement of DTMF circuits/MF senders /MF-receivers in an Exchange.	Contact C-DOT.
39	How to see the meter reading of free TENs (Not associated with DIR nos.)	Implemented in next software release.
40	Threshold alarm is not available for STD calls of long duration.	This is being implemented in next software release.
41	What is the maximum length of IOP to CM signal cable. Whether normal switch board cable can be used for this purpose.	Assembled cable of length 35 mtr is supplied. It is a shielded cable. The normal switch board cable is not recommended.
42	CPU-S05 replacement procedure and cut/strap at BID card	Modification at BID card is not mandatory Procedure of replacement of CPU S05 is same as of CPU S04 card
43	In Trunk BM is it possible to use all the TUs as digital TUs.	Yes it is possible to use it subject to maximum of 13 PCMs in BM-L and 15 PCMs in BM-XL.
44	Route modification command requires entry of old parameters also alongwith charge parameter.	Valid Suggestion. C-DOT will consider it in future software release.
45	Long distance circuits channel to channel not available in MBM	P Wire facility will be considered in next s/w release.
46	On TTY terminals at MDF, capacitance test shows failure even though line is OK.	Line categories are to be defined properly. Refer Annexure-15.
47	SCBR (Subscriber credit bill record) mentioned in documents - but not working actually	Not implemented
48	Momentary i.e., 10 sec urgent alarm for BP during sometimes	Alarm introduced for unit status changing to suspect
49	What is the STD call counter last value? (CDOT MAX / ILT)	Last value is 65536.
50	Is there any routine to use audit command.	To be used only to clear false alarms.

Sl. No.	QUESTIONS	COMMENTS
51	Answering - Circuits could not be formed even after acceptance of all parameters such as ports etc.	Creation of answering cct possible. For any clarification contact C-DOT.
52	The DTS and DTK going faulty during night time showing oos.trans so many times. But after making out and cooling it near A/C it comes in service. But at the same time newly installed 1K in the same room (UTL-make) is not giving any problems due to A/C	DTK goes to OOS-Trans due to media flicks. Check Media stability. Not affected by temperature.
53	The printout of subscriber under malicious call observation shows STD code and part of subs no. on calling no. Since it is only a 7 digit display identifying calling no. is not possible. How to eliminate the STD code (or) How to change the no. of digits	Modify Sys-param → Num-Ani = 10. And reset MFCs and then force OOS/INS.
54	Detailed billing is to be issued to all subs centrally from TRA. For this, the BC cartridges are taken from C-DOT and the NCBR files are downloaded in a PC and the printouts are generated. There are few problems in it. The utility 'BF' is used for downloading to PC. This works in PC of lower version i.e. upto PCAT 386 only. This takes lot of time and very difficult. The 'BGS' software is used for taking output. This has got some drawbacks. Is there any other utility for this.	Hardware for 'BGS' package has become obsolete and further upgradation in "BGS" package has not been done because DOT has developed its own TRA Package called "TRICHUR". This package support C-DOT SBM / MBM exchange BC cartridge taken by copy-out command.
55	How to calculate local call success rate ?	Presently originating traffic (successful) and incoming traffic (success) available. CCR for Local call will be provided in the next S/W.
56	While creating TGP, if '-' is given for TGP-NAME it is not immediately saying as 'invalid input'. After execution it is showing error.	S/W implementation is done that way.
57	While retrofitting from 8.9 to 5.43 all the nos. in the frozen list were found to be unfreezed what should be the precaution ?	Use crp command 'displ-dirno-rsrv' to take a list of frozen numbers prior to retrofit.
58	Even after changing the control cards - getting one pip tone at equal interval during that time speech is disturbed when the conversation is going on.	Call waiting called facility given? Check up. This will be taken care in the next s/w release.
59	For a particular subscriber for MOD-SUB-TEN command, the meter reading getting changed.	Meter readings are associated with TEN only. It will get transferred during MOD-SUB-TEN to new TEN. If you delete and create with new TEN then only meter reading of the TEN

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

Sl. No.	QUESTIONS	COMMENTS
		assigned will come into picture.
60	3 minutes beep sound is creating problem in data circuits, is it possible to suppress beep sound for one particular line.	Beep should be disabled, according to DOT policy, by defining 'No-Beep' in crg-rtn.
61	If we have 30 junctions in one TGP with 15 junction in one DTK and remaining 15 jns. in other DTK, calls are always landing in first 15 jns. during slack hours, only when calls are more than 15 in one particular time then only calls are landing in the next 15 jns. of other DTK.	It is implemented so. Progressive Hunting is within the PCM and sequential across the BMs.
62	In displ-trans, transaction such as displ-sub and copy-out, copy-in are also coming. These are not required and were not there in 8.9 version.	Copy-out, Copy-in commands are required to be monitored, so these are put in transaction log.
63	SW units faulty showing on ADP. But in sys-All, SWU-status showing ins-act/ins-sby (units are actually faulty)	When a unit is put under OOS-SUS the alarm will be raised. By giving displ-alarm-list-find out the unit and by giving displ-SWU-status check the unit status, if displ-system-all is showing any delay in updation. Give soft start to system using "init-sys" command, if the delay is too much.
64	In 5.23V please give the commands for "to copy in" the disk from cartridge (BC) for taking Rgen ncbt for EMC cases. To remove the unwanted BC to create space on the disk.	Do it in standby IOP, in warm level and take the printout and del 'BC' using Del-Fgp-File, for the unwanted period.
65	When putting IPMs some times the lines are getting disconnected.	Not properly jacked in or IPM is bad.
66	When no. is created the no. is going to OOS-SE.	SPC card may be bad, or TTC is INS & TU is not through to TTC.
67	Can we convert TWT cards as LCCs.	No.
68	While deleting a subscriber, with del-sub command in some cases it is found the sub is under 'NBR-CNG' observation and it is not possible to delete.	You have to remove the subscriber from observation list and then delete.
69	Exact no. of subscribers having STD/ISD facility will not be obtained by displ-sub-list command.	Solved in 5.43 S/W.
70	MEM DGN abort sometimes even if TME is mounted.	Some other switch unit is suspect at that time. Moreover SBY BP must be there.
71	In an MBM, while taking the detailed bill of a no. it is found that calls made exactly 1 year before is shown now. It is suspected that BC for that period might not have been deleted.	BC for previous year to be deleted every year. Refer Annexure-13.
72	In all exchanges, test no. is created (eg:835111). On dialling the test no. after 2 cycle, the call is	It is implemented like this.

Sl. No.	QUESTIONS	COMMENTS
	disconnected.	
73	In Kangirappally MBM, many subs request for conference facility, can we provide that ?	3 Party Conference is available without conference card. Releasing the service is matter of DOT policy. More than 3 party will be released in next S/W version.
74	Call transfer facility is given to no.(eg.802000). The sub transfer the calls to 565777. (a no. with 90 sec pulse metering). Another sub who dials 802000, will get 565777 in single metering even if he speak for 1 hr.	No policy for spl. Service in DOT. Check DCBR in ncbr and add it to meter counter in Bill manually. Implemented in next s/w release.
75	On taking traffic on junction between one SBM and MBM, the success rate is shown only 15%. But the junction are provided on digital trk via PCM and whenever we dial, we get in the 1 st instance and there is no congestion or failure observed. Kindly explain in detail, how junction traffic can be taken correctly ?	Problem with traffic reports to be taken care by CDOT in next release.
76	Call disconnect after one call duration for CCB sub. Whether this is applicable SBM/MBM ?	Not available in (SBM/MBM S/W). Will be implemented in next s/w release.
77	The time required for testing a line using the command TST-TRM and test set no. such as 106 etc. is too high in the order of one or two minutes. We should have some methods for testing the lines quickly within 5 to 10 sec. The parameters to be tested in this method can be limited to earth on each limbs and condensor (capacity testing). Only in cases where all other parameters are required we can use the present procedure which will take more time.	Suggestion Noted.
78	Using latest s/w 5.43V and taking traffic into consideration, is it possible to have 5:1 concentration so that more shelves can be added in LM2.	This is not possible as only 4 TICs can be equipped in one chain.
79	With 4:1 concentration and 5.43V/5.23V, how many maximum no. of subs can be connected ?	2024 subs in line BM (i.e. only lines).
80	For MCR only TEN no. will be given. Whether it is possible to get subscriber telephone no. of distant station in new version ?	CLI possible on MF signalling route. It should have MF signalling in whole chain.
81	Two different taluk places of same SDCA routed through LDCA. Is it possible for '90' dialling facility for the above two taluks ?	Possible.
82	Can we modify a/c RSU to non a/c RSU.	Some components in some cards have to be replaced.
83	When a no. has call waiting controlled by called sub (TRM facility) we cannot keep this no.	Combination not allowed because both use flash.

PROBLEMS REPORTED DURING C-DOT WORKSHOPS

Sl. No.	QUESTIONS	COMMENTS
	under mal.obs. unless TRM facility is withdrawn.	Implemented in next s/w release.
84	At present 2 units are charged at the time of registration. If we register the alarm for more than one day i.e. 10 days or 20 days, then only 2 units are charged on the day of registration and subsequently usage will be there and no charging.	Implementation is like this only, as per TEC specs.
85	It is said that one time slot in ANNC is used for control purpose including that of extending any annc from the “start position”. But annc do start from anywhere.	That time slot is used for maintenance.
86	Com-bill not appended with commercially affected commands - restoration STD/ISD & DNP R-DNP DSC RDSC (mod-lin-sta)	Use displ-trans command.
87	DSC subs also put under BNP-DISC - gets BNP annc when lifted phone.	This is as per TEC specs.
88	Vendors for ESM, ESL & ETS card Vendors for IOP latest version	All approved C-DOT vendors. Refer Annexure – 18.
89	Sending double pulse to remote caller at some of the routes at the time of answering and no metering pulse afterwards in group dialling.	In charge rate no. to be used for satellite exchanges, make initial change as '0'.
90	Some of the calls on ISD routes failing and CLI sending is required by higher order TAX.	256P RAX/SBM & MBM support CLI.
91	Whether ISDN facility available in CDOT MBM.	It is available in next S/W version 2_1_1_1.
92	Why only forty jns. are kept in one tgp, with which the tgp status cannot be seen if jns are more than forty.	C-DOT implementation is like this.
93	Tone test gives no metering on local call.	Implementation is done that way.
94	Command file execution in calendar is not possible	Limitations. To be implemented.
95	'Please try after some time' to be removed. from 'BNP' Announcement.	Implemented in next s/w release.
96	Can we have a list of all STD/ISD subscribers at any time?	Yes, in S/W P5.43, “displ-sub-list” command can be used to get correct list of all such subscribers. Through 'rgen' also we can have the list using script file 'linchr'.
97	Is it possible to provide “Morning-Alarm” facility to all the subscriber of exchange.	Yes, all the subscriber can be provided with this facility.
98	Is it possible to feed different announcement	No. It is not possible right now, but new

Sl. No.	QUESTIONS	COMMENTS
	(e.g. wishing you happy new year, etc.).	announcement card is being designed.
99	How many subscribers can access '162' at a time?	Only one subscriber per BM.
100	Is it possible to charge CCB-LCL and normal subscriber differently. Say CCB-LCL having 5 min. metering and normal subscriber fixed metering.	Yes. For local CCB sub, sys-parameter 'pco-mtr-lcl' is used. While Lcl-sub 'mod-sub-crg' is used.
101	If on TAX-route TGP, ROD=1 and min. digit seize forward = 2 or 3 or 4. What will be the effect on seizure of ckt. and will this lead to overloading in the exchange.	Min. digit seize forward will decide the time of seizure of the trunk. If it is 4 instead of 2 it will reduce the abandoned traffic on TAX route.
102	How to get following: 1. Total traffic of Exchange 2. Total traffic TGP wise 3. Local traffic.	1. Total attempts in Exchange Performance Report. 2. TGP wise total traffic is available. 3. Local traffic will be taken care in next software version.
103	Is it possible to get rejection of calls on a particular route. Can we get the revenue for route.	By putting route under observation using MOD-ROUT-OBS command it is possible to get the calls failed on a particular route. But it is not possible to get revenue per route.
104	What is the maximum concentration possible. Is it possible to get 6:1 concentration.	Software wise we can get a maximum of 4:1 concentration. But if trunks are distributed across TUs and then software wise it is equipped with 4:1 concentration, then practically it will result into higher than 4:1 concentration. Say a DTU with 2 PCMs equipped and concentrated with another 3 TUs with lines, then for 64 time slots there are 384 subscribers leading to 384:64 or 6:1 concentration.
105	Details of 'Alarm Sequence Number (ASN)' not available.	Full details are available in document "Alarms and Reports in C-DOT DSS MAX".
106	The status of 3/4/6/8 party conference facility in C-DOT.	Till S/W release 1_4_5.43_3, only 3 party conference is possible, for which 'CNF' card not required. In the next S/W release 2_1_1_1, 4/5/6 party conference will also be provided, using a 'CNF' card. 8 party conference is not to be provided.
107	Test set nos. with there applications, for LCC, Trunk Cards, Service Circuit and DTKs, should be available.	Complete information is available in Document "Maintenance Procedure" or Maintenance Commands".
108	What is utility of init-sys/init-mod command	Most common init-type options for system

Sl. No.	QUESTIONS	COMMENTS
	with various [init-typ] options.	initialisation are: 1. SOFT START: During soft start OS-DATA is reloaded. All the processes in BP are reinitialised. All the switch units are reinitialised. Soft start has no effect on Subs Meter reading and dynamic STD facility. 2. STABLE CLEAR : In case any exceptions encountered in the read/write area, system may go for stable-clear. During stable clear, all calls in that module will be terminated. OS is restarted and units are reinitialised. Read/Write data is reloaded from IOP to BP/AP. Read/write data includes administration, call processing. Meter Reading is not downloaded. Subs having dynamic STD will not be affected. 3. PART-INIT : Under part-init, all the 'read-only' as well as read/write data is loaded from IOP to BP/AP. Here all the data related to Exchange Data Base, Administration, Call Processing and Maintenance is reloaded. All processes are initialised in BP/AP. All the units are reinitialised. Here Meter Reading is also down loaded to BP. All the STD subscriber having dynamic locking facility, will get locked.
109	What is the difference between 'init-sys' and init-mod' command.	In case of SBM exchange, function of both the commands is same. In case of MBM, the two commands have different effect. 1. INIT-SYS : when 'init-sys' command is given in an MBM exchange, the whole system (AM, CM & all BMs) is initialised upto the mentioned 'init-type' level. 2. INIT-MOD : 'Init-mod' is meant for individual module in an MBM exchange. In case of BMs, individual BM will go for initialisation. In case of 'init-mod' to 'CM' all the BMs will go for initialisation upto 'SBL-CLR' level (whether softstart, SBL-CLR, Part-init or even code-load). In case of 'init-mod' to AM, all the other modules (i.e. CM & all BMs) will go for 'SBL-CLR' irrespective of the 'init-type' (whether code load, part-init, SBL-CLR or softstart) given to AM.
110	Is is possible to concentrate DTU with another DTU, when each stream is having only 6 to 8	Yes, it is quite possible. For optimum use, refer Annexure – 17.

Sl. No.	QUESTIONS	COMMENTS
	channels assigned.	Annexure – 17.
111	B/W is not working on PCM trunks.	Digital BW is not implemented.
112	Call overflow meter indication not observed even during congestion period	Not implemented in 1_4_5.43_3.
113	Any spl. Route is there other than level 1 ?	ILT special routes may be there in case of ILT exchanges. Also 96 pager-route.

7.3. SUGGESTIONS/REQUIREMENTS FOR SBM/MBM

Sl. No.	SUGGESTIONS/REQUIREMENTS	COMMENTS
1.	Modification of Line/Register signalling is not possible. TGP has to be deleted. In case of TAX it will be a cumbersome procedure on TAX if lot of routes are going on a particular TGP.	It is a good suggestion. It will be provided in next software release.
2.	It should be possible to allow one category universally in all the routes.	Suggestion is good. We shall try to implement it, otherwise a separate utility will be generated to accomplish this.
3.	Protection Module should be such that in case of removal of GD tubes, it should not make the lines through	TEC approved connection type modules provided.
4.	Deletion of upto date commercial bill record while deleting BC for any date not yet solved.	Reload BC, so as to restore com-bill file. Problem is being taken care of in next S/W Release.
5.	NUM-ANI=10, this will not support cellular and ISD no. calls in CLI, because length is more in these cases.	As per TEC specs only 10 digit CLI is required in DOT NETWORK. SO NUM-ANI = 10 is sufficient.
6.	Display call info is given in Admn.23. It should be changed to Admn-10 or mtce 7.	To be implemented in next s/w release.
7.	Separate category is required in MOD-LIN-STA for keeping the Nos. under 'SAFE-CUSTODY'	To be implemented in next s/w release.
8.	Remote alarm no. should ring only for SWU alarms so that the purpose will be utilised fully. Remote monitoring can have non urgent/urgent/critical SWU alarms.	To be implemented in next s/w release.
9.	Call counter for ISD, STD, local for a day can be introduced.	To be implemented in next s/w release.
10.	While doing any modification in CDOT, in transaction files, the original data already existing is not recorded, only the operator input data and new modified data are recorded. What is required is old and new data ?	Suggestion Noted.

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Sl. No.	SUGGESTIONS/REQUIREMENTS	COMMENTS
11.	Dial-by-eqpt facility should be available for the OOS-OPR terminals (trunk ports) only.	Suggestion taken.
12.	During the back-up the blocks may lost sight of for recording in the register. It consumes considerable time to re-read the Tape. Provision may be made either in the trans.recorded or the files recorded to save time.	Suggestion noted.
13.	The disability of automatic locking of un-locked subs. Whenever part init. or above are given is to be removed in view of the problems it creates to the maintenance staff of MBM/SBM.	Alternate solution is being implemented in next s/w release.
14.	ROD is attached with TGP. It will be convenient, if this parameter is associated with route. Also min-dgt-sized forward parameter.	Suggestion Noted
15.	No facility to take list of INS-LLO subs of all BM in displ-trm-all. It is suitable for SBM or MBM < 2K. But MBM with 20K we have to give displ-trm all for each BM. BM no. option "ALL" should be provided in command.	To be added in Rgen INS-LLO. For total displ-lscnt-oos can be used. For details new rgen can be used.
16.	On CCM card instead of two ports, provide 16 kHz for all the 8 ports.	Suggestion noted.
17.	Calendar management in day-type in TAX exchanges automatically instead of yearly changing of day-type.	Suggestion noted.
18.	Introduction of protection in LCC & CCM card although in MDF. Due to Lightning and accidental A.C. surge, Card damages & . Exchange collapses.	Suggestion noted.
19.	Automatic restoration of LCC card if Jacked out by mistake instead of going to OOS-SE.	Implemented in next s/w release.
20.	12V supply failure in PSUI is not raising alarm - when the other copy of PSU also goes bad - affects 128 or more subs should be modified.	Suggestion Noted.
21.	Cannot interrogate DTKs of RSUs whether calls are in progress.	Suggestion Noted.
22.	DNP / DSC subs also get LLO annnc - "presently o/o/o dial after sometime" misleading callers. A separate annnc "Out of service" required.	Implemented in next s/w release.
23.	Bulk meter not shown after "cre-sub" or "del-sub"-required very much.	Implemented in next s/w release.
24.	Rgen ictgp, ogtgp do not show % of success - total attempt total success cannot be used for fast analysis.	Possible. Can be implemented.

Sl. No.	SUGGESTIONS/REQUIREMENTS	COMMENTS
25.	There is no meter formatting for deleted nos. i.e. the numbers under frozen condition. Hence formatting for all numbers i.e. for free and frozen is required so that meter count can be observed for spare nos. time to time.	Next S/W will take care to display meter reading for free nos.
26.	There should be s/w for taking direct bulk counter of all nos. from IOP to common PC i.e. (in foxbase meter reading program) so that manual billing of meter reading can be avoided.	DOT billing package is there which has been standardised.
27.	Is ringer based PSU required for DTK BM? As there ringing current is not required.	Ringer is not required for digital BM.
28.	Whenever STD-facility granted to sub with dyn-lock then the lock will be in open condition instead it would have been in lock condition as it happens to maintain staff to physically go in switch room & lock.	Implemented will be done in next software release.
29.	Some of the subscriber facilities which are not available, should be marked.	Suggestion is good. But not feasible in software. However, information is available in documents like 'Subscriber Features'.
30.	Detailed Billing should be available on O/G & I/C TGPs also, so that detail bill could be generated for 256P RAXs connected to SBM-TAX/MBM-ILTs.	Detailed Billing feature is available in S/W Released in 1_4_2.25_4 and subsequent releases.
31.	Automatic backup for dumps for 'Ed' & 'bd' once a day, should be provided.	Not provided in software. However, 'Calendar Management' can be utilized to give commands for 'Ed' & 'Bd' backup, at the desired time.
32.	There should be ring discrimination for Local & I/C ISD calls, just like available in OCB exchange.	Not possible at present. Next software version will take care.
33.	STD/ISD subscriber having dynamic control should not get locked after giving part-init/code load to the system.	Being implemented in next s/w release.
34.	BM / TGP traffic report should be available through 'rgen' utility.	It is already available in rgen V 7.2
35.	Meter reading should be associated with directory number.	Implemented in next S/W release.
36.	It is desired to reclassify the command classes.	Classes have been reclassified to meet field requirements in next s/w release.
37.	It should not be possible to go to 5C> or 5D> prompt from operator account.	Implemented in S/W release.
38.	Dynamic locking procedure should be similar to E10B i.e. 124 XXXX etc.	Implemented in S/W release.

Sl. No.	SUGGESTIONS/REQUIREMENTS	COMMENTS
39.	RGEN utility for 5.43 is not compatible with 1_4_2.25_4 software.	It is now available in latest version 7.2.
40.	In 1_4_2.25_4 software RGEN utility to take care of TGP detail billing records and TGP meters.	It is available in new version 7.2.
41.	It should be possible to see Displ-cdr for trunk observation.	Alternate solution is implemented in next s/w release in the form of MFSA. It can be seen through rgen trkcd. r.
42.	It should be possible to lock only ISD facility through dynamic locking.	It will be implemented in next software release.
43.	Traffic reports are confusing. Data should be available as in E10 B.	Implemented in next S/W release.
44.	Is it possible to connect PC, to the IOP through modem? So that we can control 2 or 3 exchanges from Head Quarters.	CEMS will be released soon.

7.4. PROBLEMS RELATED TO 256P RAX/128P RAX

Sl. No.	PROBLEMS	SOLUTIONS / GET-AROUNDS
1.	Media is 30-channel digital UHF. The exchange is 256T. Exchange fails often. After resetting or switching on/off, Exchange restores. Reason is to be known.	Solved in 2-1-1.
2.	RAP card of 256 RAX often fails, other cards intact. Earth value is < 1 ohm. Why?	If it is due to lightning. A change of IC can protect RAP. Contact C-DOT.
3.	Dynamic barring fails more often in 256 RAX.	Solved in 2-1-1
4.	It has been made to understand that '90' calls are to be treated as STD and the CRI for STD route calls to be given the value 'E' instead of 'F'.	Info. is wrong. For STD and Reg STD, CRI=F.
5.	Both copies of RAX 256 working alright. But the system changeover to simplex mode frequently and after automatic recovery again it becomes Duplex working. This problem is noticed in both RAX 256.	H/W problem. Try changing RSC/RAP card of the copy going OOS.
6.	In 256 RAX CDOT, STD metering is taking place but STD counter is showing "0"	For STD counter increment the CRI should be set to F for TAX Route.
7.	When CDOT 256 is connected with SBM through PCM i.e. SBM end Analog basis and CDOT 256 End digital stream basis, only one way call establishment (SBM to 256). But 256 to SBM call failing.	Mux jumper setting problem, details can be obtained from CDOT control room or MUX specialist in DOT can be consulted.

Sl. No.	PROBLEMS	SOLUTIONS / GET-AROUNDS
8.	In 256 RAX, some local nos. like 32722, 293129, 62333, 47122 are not getting on IC jns.	This problem is solved in 2-1-1 S/W.
9.	When a subscriber hardware type is given as CCB instead ordinary line with non home meter in LCC card position and unit fee is given then for long distance calls only one unit is advanced. When continuous / home meter is given then only multimetering is possible. This gives scope for loss of revenue.	Problem solved in S/W 2-1-1.
10.	Numbers of E10B exchange with malicious facility are not getting for CDOT 256 when CLI sending request is given in a route. When CLI sending disable is given then numbers are able to get.	Solved in S/W 2-1-1. In case of sending CLI on a TAX route, 'Self TAX Code' must be defined.
11.	In MF Indian R2 signalling, 180 is unget from CDOT 256 via SBM512, getting the same when decadic is given.	Problem solved in 5.43 (SBM/MBM) and 2-1-1(RAX) S/W
12.	In other 256 exchange, if we give call queue facility to a sub, caller gets announcement that, he is in queue and the called subs gets indication tone. When the called subs puts off his handset, he is getting ring and the caller getting still announcement instead of ring back tone. When the caller lifts handset he neither gets speech of called nor dial tone.	Solved in next s/w release.
13.	256 CDOT test 1, test 2 fuse blown display is coming even though fuses are ok in RTC card.	Solved in s/w 2-1-1.
14.	In 256P RAX, in case of CRI=F, calls getting disconnected after 60 sec., in case of routes having charging pulse of 90 sec.	In latest S/W 2-1-1, this time out feature of 60 sec. has been removed, thus the problem has been solved.
15.	In 256P RAX metering stops after few hours, on trunk routs. When system is initialised, metering starts again for few hours.	Problem not repeatable in Lab.
16.	One 256P RAX is being used as Group Dialling Exchange & connected to Two 256P RAX and three 128P RAX exchanges. For group dialling, level '8' is being used. For STD access to 256P RAX exchange, level '0' has also been opened on same TGP. Now 256P RAX subs, started getting STD routes by dialling 80XXXXX. How to avoid this?	This is basically result of wrong data creation. Vary first thing, O/G TGP between 256P RAX to GDC 256P RAX should have ROD=1 only. In case of 128-P RAX there should be no digit suppression on direction 'X'.
17.	Both copies work OK in simplex mode, but do not come in duplex.	The problem could be either in RAP card or motherboard itself.
18.	In 256 RAX exchange having S/W 2-1-1 & connected to SBM RAX (5_43 S/W), through	Problem under observation.

Sl. No.	PROBLEMS	SOLUTIONS / GET-AROUNDS
	TWT trunks, few channels get blocked every day.	
19.	I/C call on trunks not landing on sub. No. DE333 (when DE is EXCH-CODE)	Solved in S/W 2-1-1.
20.	When a local call is established, a beep is heard by the caller during conversation. During beep sound, speech is clipped.	In case of S/W version 1.05, verify mode of local metering <AUX> <2> <3> It should show 0000. If it is other than this, change it . This problem has been solved in S/W version 2-1-1.
21.	All the subscribers getting STD, although subscribers parameter showing "STD Not Allowed".	This a case of wrong data creation. If direction '0' is opened with 1 st digit analysis, then barring will not be possible on any no. Reconfigure direction '0' as TAX-ACCESS.
22.	For TAX calls (Level 0), STD counter not updating, but Bulk Counter getting incremented.	Note down value of OGCC for route 0 (say OGCC = 2), then for OGCC = 2, ICC=1, CRI should be 'F'. If CRI=E is defined, then STD counter will not update.
23.	OG restriction (dynamic STD) facility not working for a particular subscriber.	Allow special service to the subscriber.
24.	Trunk offering facility not working in 256P RAX.	For trunk offer facility to work in 256P RAX, conference card (CNF) must be provided in slot no. 7 of Master Frame and in 'TGP' parameter 'trk offer facility' = yes & operator TYPE = Opr Trk.
25.	How to replace an RAP card. Suppose a standby RAP card is to be replaced & second RAP card to be put in the system to make it duplex.	Following steps to be done: 1. Never switch off the Power Supply. 2. Replacement or duplexing to be done in power-on condition. 3. Remove the standby RAP card/out of service card and replace it with a good one. 4. Ensure that the new card has the same software PROM checksum. 5. Insert the card in the power-on condition. 6. Reset the new inserted card to boot. 7. It will automatically take the data with meter reading from the active RAP and will become standby.
26.	Excess metering cases reported.	This can be due to following two cases: A. Wrong Data Creation: If proper Charging Rate Index (CRI) is not assigned to OGCC of a

Sl. No.	PROBLEMS	SOLUTIONS / GET-AROUNDS
		particular route then excess charging can occur as under 1. Only for the local exchange subscriber and normal for subscriber of the satellite exchange. 2. Excess charging for the satellite exchange subscriber and normal for local exchange subscriber. 3. Excess charging both for the local subscriber as well as the satellite exchange subscriber. This will result into uniform excess metering for all subscriber and not individual subscriber meter spurt. B. Wrong Maintenance Procedure: 1. Frequent switching ON/OFF the power supply can result into spurt metering for individual subscriber randomly. 2. Different version of software PROMs used in both cards. 3. Wrong procedure adopted for replacing out of service RAP card. Suppose one RAP card of some other side or RAP card out of service for a long time will have different meter reading. Now if the system is switched off before replacing the card, then it is possible that when the system is switched ON it may boot up with new inserted card and system will have a different meter reading. This will also copy the meter reading on the previous active RAP card. This will result into excess/under metering. Then there will be no way to recover the original meter reading. Correct sequence to be followed for replacement of card is given in Problem No. 1. 4. Frequent tripping of the Float rectifier and battery take over can result into spurt for individual subscriber meter.
27.	In 256P RAX for testing TWT or E&M trunks, one trunk port is defined as test port. If the port is faulty, test result of all the trunk ports will fail.	Under such condition change the test port and confirm the results.
28.	Manual reset does not work in RDC card.	Normally 'Reset' works all right. May be due to one particular card having this problem.

Sl. No.	PROBLEMS	SOLUTIONS / GET-AROUNDS
29.	On route '0' it is possible to create only eight routs.	256P RAX is not supported to work as TAX in the network. Eight routes on level '0' are bonus.
30.	Maintenance panel not working for copy 1. All the cards are in good condition.	- Check RAP-1 card by replacing it. Check cable from MP to Mother Board. Check by replacing MP also. - Check RAX-MP link at Motherboard for copy – 0 : 13Bb24-Tx-2Aa2 13BC24-Rx-2Ac2 copy – 1 : 14Bb24-Tx-2Aa3 14BC24-Rx-2Ac3
31.	Digital trunk in CDOT 256 with 1.05 version is not working with CDOT SBM/CDOT MAX/ILT with 5.23 version in all types of signaling	Solved in 2-1-1 for RAX & 5.43 for SBM/MAX.

7.5. INFORMATION REGARDING 256P RAX/128P RAX

Sl. No.	QUESTIONS	COMMENTS
1.	Level-9 detailed billing facility not available.	Details billing is provided for level 90 in 2-1-1 s/w as per TEC specs.
2.	CDOT-128, ROD from parent exch to terminate exchange could not be kept as '1'	Upgrade 128 to 256 P RAX.
3.	Only ISD baring facility not available in CDOT-256P, CDOT-128P	Available in CDOT-256P from release 1.04 onward.
4.	MF register in CDOT-256 inadequate-MF register shows failure	2 Nos of RMF cards provided are adequate.
5.	DCR blocks insufficient.	256 records only due to H/W limitation. Use PC for dump.
6.	In 2-1-1 version, if any mischievous person has changed the "SU"-PW purposely what is the solution to "Log In"?	The purpose of password is to avoid mischief. No solution.
7.	In COMaC the following observation are made. 1. Modification on MF channel cannot be made. 2. Testing of subscriber lines (exchange and external) exchange end not provided. 3. Link is not established through the tie jns between two 256 RAXs.	The first two are implemented as it is. The last one is under CDOT observation.
8.	In slave frame 10 & 17 slots are not getting E&M status. Only LCC and TWT option is available.	In slave frame, slot 10 and 17 cannot be used for E&M cards.
9.	In most of our 256 RAX, Announcements are not getting with one RAT. With the two RATs	With only one RAT - tones alone will be active. For tone and ANNC both the cards should be

Sl. No.	QUESTIONS	COMMENTS
	getting announcement.	present, as passive-copy 'RAT' feeds announcements and active copy RAT feeds Tones.
10.	In Yellampet CDOT 256 exchange, if we provide DTMF facility to a sub, then No. gets busy tone instead of dial tone if that subs lifts handset. RMF cards are OK (i.e. tested at other exchange).	RMF channels should be programmed for DTMF circuits also for a DTMF subscriber to get dial tone.
11.	On dialling the diagnostic number, printer not present / printer power failure condition is permanently extended by continuous test tone even if printer is present and ok.	Solved in s/w release 2-1-1.
12.	For Sub DCR & meter readings, max 256 records are provided. Whether these 256 records are included for TGP DCR record also or separate TGP DCR records are available?	Max records are 256 only which includes all.
13.	Whether date & time records of S.U. password change and using available?	Not available
14.	Can all the subscriber be STD-PCO?	Since the traffic handling capacity of 256P RAX is 6000, it is not recommended to use all the subscriber ports as STD-PCO.
15.	Can all the subscriber be given DTMF facility?	Yes, all the subscriber can be given DTMF facility. It is expected that such subscriber are provided DTMF instruments also, otherwise it will load the exchange.
16.	In 256P RAX, super User password should not be unique. This creates problem of unauthorised manipulation.	In S/W 2_1_1_1, super user password is modifiable, thus solving this problem.
17.	The Detailed Call Record (DCR) is stored for a limited no. of calls. It should be increased.	Not possible. However, 'PC' connectivity to Maintenance Panel is provided and using PC based 'DUMP' s/w or COMaC software, DCRs can be stored in the 'PC' at regular intervals.
18.	Can LCC, TWT & EMF cards be jacked out/in in PSU ON condition?	Yes, these can be jacked IN/OUT without any problem, in PSU ON condition.
19.	How to create special service Nos. like 100, 197, 198 in 256P RAX?	Refer Annexure – 1 for creating such Nos.
20.	DTMF facility is not working when facility programmed.	DTMF channels to be configured in RMF.
21.	MF facility on jns provided, often hangs.	Test RMF channels

7.6. SUGGESTIONS/REQUIREMENTS FOR 256P RAX/128P RAX

Sl. No.	SUGGESTIONS/REQUIREMENTS	COMMENTS
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Sl. No.	SUGGESTIONS/REQUIREMENTS	COMMENTS
1.	Distant end hot line facility between two stations without any equipment such as 2W to 4W conversion etc.	Will be available in future s/w link.
2.	If the TGP is in decadic mode RECD 3-2-3 is possible	Not possible.
3.	Modem card may be incorporated in RAX 256 switch itself.	Suggestion may be considered for future implementation.
4.	In 256 RAX '00' route may be treated as separate so that, the route may be barred for any i/c TGP, (as in SBM priority decides routing).	Suggestion noted & will be considered in future s/w release.
5.	While doing modifications using COMAC s/w, there should be a provision, such as, respective RAX user / S.U. password to be used. A common S.U. password should not be used.	Password option is being included, to provide full proof security in the next COMAC S/W version 1.21(a).
6.	Level 1 (max) 10 route codes are only allowed in level spl.ser. Not able to allow more route codes.	On level 1, upto 20 routes will be made available in future release..
7.	We talk about Remote monitoring alarm but in field we have 99% all RAX working in simplex copy and same facility is not useful in simplex copy working, in which p/s unit is also one. In RAX 128, if we dial xxx200 for Remote monitoring alarm due to single p/s unit it will continuously give s/b p/s unit fail. Alarm, so could not go for further test. Hence is there any solution to have these facility can be had in simplex copy or in case where only one p/s unit available.	No solution possible for Site specific maintenance problem
8.	Details of the Modifications, subs, creation/deletion done through COMaC should come on printer.	Suggestion noted.

Chapter 8.

Enhancements From C-DOT

8.1. UPGRADATION OF 128P RAX TO 256P RAX

The initial impetus behind the development of C-DOT 128P RAX was to replace the then existing electro-mechanical strowger exchanges with digital automatic exchanges. The rural transmission network was and still is predominantly open wire. The exchanges were realised only as terminal exchanges, that is, without transit capability. The signalling on the subscriber loop and trunk interface was decadic and the STD facility was extended on open wire carrier systems with decadic register signalling. This lead to misuse of these facilities and the subscribers often complained about the excess billing.

In order to provide enhanced features to subscribers and digital connectivity to the network, it is being felt strongly by field officers to upgrade the existing 14,000 C-DOT 128P RAX to C-DOT 256P RAX.

This need has long been recognised by C-DOT and thus developed 256P RAX exchange which besides having larger capacity to cater to rising demands for connections, presents graceful solutions to demanding requirements which were not present in C-DOT 128P RAX.

An upgradation strategy will thus have to satisfy the following requirements:

- To provide all the subscriber features and interfaces available in C-DOT 256P RAX e.g. DTMF dialling, MF and digital PCM signalling schemes, dynamic service restrictions, detailed billing records, digital PCM trunk interfaces etc.
- Minimum cost of upgradation i.e. minimum new equipment requirements and economic utilisation of old equipment.
- Minimum disruption of services as the exchanges will be in service at the time of upgradation.
- Flexibility of future capacity expansion.

The 128P RAX can be converted into 256P RAX by installing the master frame of the 256P RAX unit in the lower slot of 128P RAX cabinet. The existing 128P RAX card frame can be used as a slave frame. All these modifications will be carried out at site. While converting 128P RAX into 256P RAX certain cards and assemblies

will go waste and certain new cards/assemblies, cables, mechanical components and add-on units will be required. A detailed document giving point by point procedure to upgrade is available.

8.2. DID FEATURE IN C-DOT 256P RAX

In order to reduce the big gap between demand and supply of direct exchange lines (DELs), DOT has conceived the idea of providing PABX lines with DID facility so that better use of cable network and switching equipment can be made. Private operators can now install switches to provide telephone services under license from DOT.

C-DOT has provided the features and facilities as specified in the TEC specifications in 256P RAX by suitably modifying the software.

This document provides the details regarding hardware and software configuration of the system, features and facilities provided, connectivity to the network and PC based post-processing of DCRs

Hardware Configuration

The hardware of 256P RAX is used for DID application. Controller cards used in DID RAX are same as used in 256P RAX. Terminal cards like LCC, TWT, EMF and DT30 can be equipped depending on the requirement and connectivity to the PSTN.

Connectivity of DID RAX to the PSTN is for incoming and outgoing calls. For outgoing calls, the junctor card is used which can receive 16 KHz pulses from the connected exchange on all eight ports. For incoming calls, the connectivity to the PSTN can be through Two Way Trunk (TWT), EMF or 30 channel Digital Trunk.

The junction card APC-JUN081/T-S03 be equipped in any termination card slot and maximum of eight junction cards can be equipped giving 64 CO lines connectivity. No hardware modification is required in the mother boards of the 256P RAX.

Software Configuration

The firmware of 256P RAX is modified for its adaptation to DID application. The software version 1.05 of 256P RAX is the base software.

Network Connectivity

C-DOT DID 256P RAX is connected to the network through CCM lines defined in Control office and CO Lines in RAX using Junctor card for O/G calls. as shown in Fig. 8.1. Incoming calls are terminated on DID-RAX through trunks which can be E&M, TWT or digital trunk.

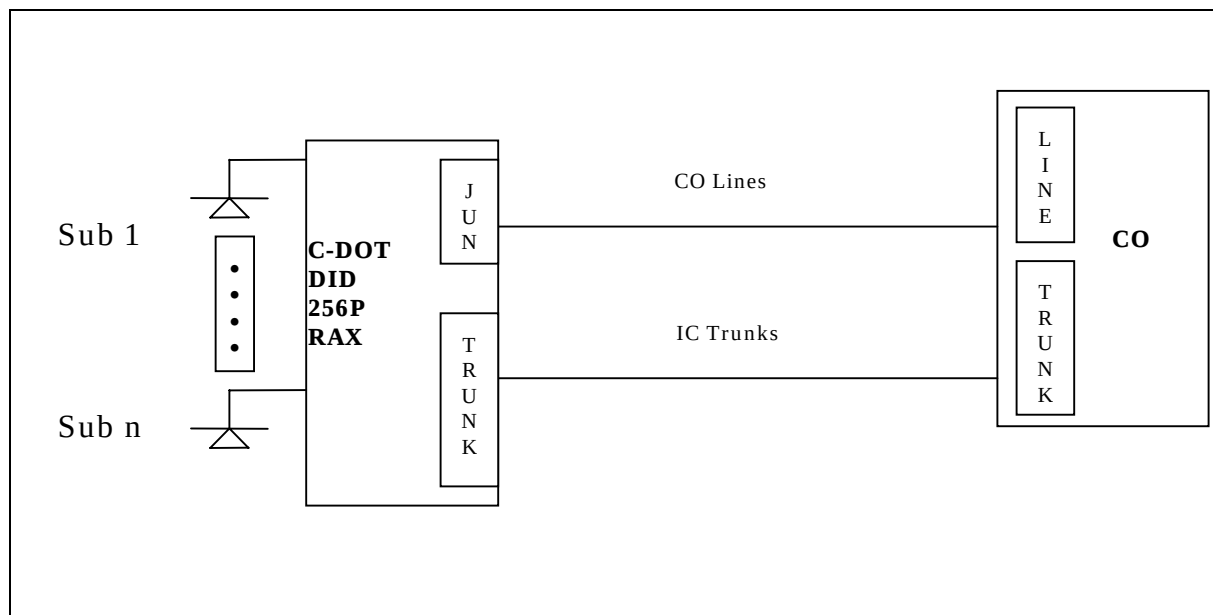


Fig. 8.1

8.3. CENTRALISED OPERATION AND MAINTENANCE (COMaC)

Thus Centralised Operations & Maintenance is a convenient and cost effective strategy for the network administration, operation and maintaining the network. C-DOT's 256P RAX offers the flexibility for local as well Centralised Operation Maintenance. The 256P RAX Centralised Operation Centre (COMaC) is a step towards today's goal of Telecom Management Network and function as a Telecom Management Centre for C-DOT 256P RAX.

The COMaC functioning as a Remote Telecom Operation And Management Centre for 256P RAX consists basically of an PC connected on a telephone line through modem. The COMaC software will be residing on the PC. All the C-DOT 256P RAXs to be controlled, will also have a Modem connected to a telephone line from the 256P RAX. This Modem has a RS-232C link with the Maintenance Panel on the 256P RAX. The COMaC can thus initiate a telephone call to/from 256P RAX Modem and can thus interact over the telephone lines with the RAX Administrative Processor (RAP) via the Maintenance Panel. The major advantage of this approach is that while local operations can be done through the Maintenance Panel as usual, the COMaC facility can also co-exist.

Normally it is envisaged that the COMaC will be located at a strategic location (typically district HOs) and will dial up the 256P RAX's in the vicinity. However, it is possible that the COMaC PC is located physically in the same room/building as the 256 RAX. Given such a situation the use of 2 Modems, 2 telephone lines and a telephone call is totally unnecessary. Hence the COMaC software also supports a

local mode of connection over a Null Modem Cable between the COMaC PC and the Maintenance Panel of this 256P RAX.

The Centralised Operation Maintenance Software resides in the PC and also in the Maintenance Panel in the RAX. The PC COMaC Software runs over MS-DOS and provides a interactive and user friendly environment for the operator. The Maintenance Panel COMaC Software has the primary function of passing messages received from the COMaC PC towards the 256P RAX administrative processor and sending responses obtained from the RAP towards the PC.

8.4. REMOTE SWITCH UNIT (RSU)

The architecture of C-DOT DSS systems supports the concept of Remote Switching Unit (RSU) from the very beginning. With the successful field trial of single RSU Module along with 10000 lines C-DOT MAX-1 Exchange at Palarivattam in Ernakulam Telecom District and the cluster of 4 RSU Modules (total 5000 RSU lines) alongwith 4000 lines C-DOT MAX-1 at Satpur, Nasik Telecom District in Maharashtra Telecom Circle, the Network Planner can go ahead with Planning/Installation of RSUs at the existing MAX-1 sites as well as new sites (under different stages of implementation). A normal SBM-RAX, without IOP/ADP can be used by replacing two cards in TSU. The details of feature highlights/planning requests are listed below —

RSU - Features (Software Rel. 1_4_x.x_3)

- Enhanced Route Code Support Unique
 - Max. 60 unique exchange codes, catering 1000 numbers each to support 60,000 directory numbers.
 - Fewer no. of shared exchange codes catering to 10,000 directory numbers each
 - A RSU can
 - ◆ Have its own unique code
 - ◆ Can share the main exchange code
 - ◆ Can share the main exchange code along with one unique code
 - Alarm reporting for PCM failure between main exchange and RSU at main exchange
 - Does not require controlled environment.

Remote Switch Unit (RSU) – Features

- Support for 4 Nos., 2 Mb PCM links between RSU module and main exchange
- New charging strategy for RSU
- Desired charging between main exchange BM and RSU BM possible
- Desired charging between one RSU to other RSU
- Max. termination of 2024 subscribers
- Max. BHCA handling capacity of each module $\approx$ 8500
- Stand alone switch to provide local switching in case of total PCM failure between RSU-Module and main exchange
- No loss of revenue for the calls made during stand-alone switching
- Automatic restoration of total services even in case of partial restoration of PCMs.
- Call saving on DTK-Failures of shifting established calls to available slots of other PCMs of the same bus.
- Trunk interphase possible in latest S/W Release 1_4_5.43_3.

8.5. CONVERSION OF C-DOT MAX TO MAX-ILT

The C-DOT DSS MAX exchanges of various configurations ranging from 1.5 K to 10 K lines are working in the country. The C-DOT MAX are integrated as local and tandem exchanges in network. In addition to local and tandem function the same C-DOT MAX exchanges can also perform the function of Trunk Automatic Exchange (TAX) when they are configured as MAX-ILT exchange. The C-DOT MAX-ILT exchange generate the different charging for various TAX routes for their own subscribers and as well as for other exchanges which are connected to this exchange. These exchanges which are connected to MAX-ILT either have the same STD code or can have the different STD code. Instead of putting separate TAX exchanges at each of small district places, existing C-DOT MAX-L exchanges can be configured as ILT.

Since the C-DOT MAX-ILT is a product of C-DOT DSS family with the same Hardware/Software the existing C-DOT DSS MAX exchanges can be converted into MAX-ILT for performing the TAX functions.

Conversion of C-DOT MAX to MAX-ILT may lead to additional requirement of trunks. The trunks capacity can be increased by inserting the additional trunk cards in the vacant slot of existing Base Module (Trunk). If the additional requirement of trunks cannot be met on some sites with the existing base module either due to non availability of vacant slots or limitation of BHCA handling

capacity of that trunk module, then additional Base Module (Trunk) is to be planned as per site requirement. Type of BM (Trunk) to be added will depend upon the type of trunks required.

Procedure for Conversion of MAX into ILT

- Do physical installation of Base Module Trunk. Add all type of cables.
- Put one IOP OOS
- Add base module (Trunk)
- Create all the data in this IOP
- Modify system parameter to configure the exchange as ILT
MOD-SYS-PARAM : XCHG-TYPE, 32 ;
- Modify system parameter OWN-STD-LEN to length of TAX code say 4 for 0141 code
- Split route 0 by first deleting it and then creating all the desired route on level '0' where different charging is required
- Draw a charging matrix of different TAX route for which charging is to be done and implemented it on routes with different categories and charge rate number
- Routes for which the charging is same only one route should be created
- For calls from a Haryana SBM to Tamilnadu SBM route 04 should be created.
- Make this IOP active and Transfer the data to AP/BP by PART-INIT.

Note :

Please refer C-DOT DSS MAX-ILT document for detail implementation.

8.6. CONVERSION OF SBM TO RSU

Any SBM exchange connected to an MBM exchange having same STD code as that of MBM, can be converted to an RSU. Prime requirement for such a conversion are given below:

1. Minimum 4 PCMs required between Main Exchange and RSU site.
2. EPROMs of all controller cards of SBM to be programmed as per MBM configuration.

3. Additional items required will be:-

3.1 Cards

S.No.	Card Type	Part Code	Qty.
SBM END			
1.	16 MB Memory Card (TME)	APC-TME464/F-S02	2 Nos.
2.	Remote Time Switch (RTC)	APC-RTS457/H-S02	2 Nos.
MBM END			
1.	16 MB Memory Card (TME)	APC-TME464/F-S02	4 Nos.
2.	Remote Switch Multiplexer Card (RSM)	APC-RSM368/H-S03	2 Nos.
Spares			
1.	16 MB Memory Card (TME)		1 No.
2.	RTS Card		1 No.
3.	RSM Card		1 No.

3.2 Cables

S.No.	Card Type	Part Code	Qty.
SBM END			
1.	RSU Clock Cable	ACB-RSUXRCXN-000	2 No.
2.	Digital Trunk Cable-I	ACB-RSUXRDXN-V00	2 No.
3.	BP Terminal Cable	ACB-RSUVTEZX-000	1
MBM END			
1.	Digital Trunk Cable	ACB-MAXRMDXX-V00	2

3.3 Modems : 2 Nos (One at RSU and one at MBM end)

4. Items that will become Redundant after the conversion:-

- Two SSM cards, which can be used as spares.
- Two TSS cards, which can be used as spares for normal BMs.
- 2 MB memory cards recovered from SSC, AP and SBM.
- Two IOP's.
- ADP

5 Procedure of conversion

8.7. CONVERSION OF EXISTING SBM'S TO MBM

This configuration has been shown in Fig. 1.1. The existing SBM exchanges will continue to work in the same configuration in Suite 1, (SBM-1), Suite 2 (SBM-2), Suite 3 (SBM-3). These suites will be converted to accommodate fourth cabinet by adding additional rack structure as shown in Figure by dotted lines. LMs of BMs will have all the six TU's fully equipped instead of three, at present. All the trunks from SBM1, SBM2, SBM3 will be shifted to BM(2) and BM(6) Trunk BM's, so that in 1:4 concentration the existing SBM will cater to 2024 subscribers. LM2 of SBM2 will be concentrated with BM4 (additional) and concentration will be 1:3 so these two BM's (BM3 and BM4) will cater to 2512 subscribers. With BM of SBM3 one LM will be added in 1:3 concentration. This will enhance the total capacity to 5792 subscriber lines, 240 Digital Trunks, 720 Analog Trunks.

For further expansion one more half suite may be added to as per Fig. 2.2 to enhance the capacity to 8300 subscriber lines.

Battery & Power Plant

For both the proposals battery and power plant of existing SBM's is to be upgraded as per MAX-L configuration. Details given in the enclosed Annexure-6.

AC requirement

Centralised AC will be required for operating MAX-L.

Cables

The requirement of power cables including cables for distributing -48V from switching cubicle to IDP/DCPP and to cabinets is to be taken into account. All the additional subscriber cables and MDF cables as per installation manual are to be taken into account.

IOP

Only two IOP's of existing SBM will be required but with one additional Winchester disk drive in each IOP.

MDF

New floor mounted MDF of 10 verticals will be required to be installed, but the back mount frames and LSA modules can be as per actual requirement. This can be calculated from Installation Manual.

Installation

First physical installation of all the additional hardware is to be done. Then data is to be created in growth mode in one of the IOPs and testing of CM hardware and additional BM hardware can be done. After this the existing exchanges are to be connected in the night and freshly created data is to be transferred by initialisation.

8.8. INCLUSION OF SBM-TAX IN AN EXISTING MAX-L

Around 100 SBM-TAX have been commissioned in the network as Level III TAX. At some places MAX-L exchanges ranging from 5K to 10k are already existing traffic from such large capacity exchanges alongwith other small capacity of the range of 1K - 2K has been diverted to the SBM-TAX. This has resulted into heavy traffic and overload problems in the system as the handling capacity of SBM-TAX is only 9000 BHCA. It is suggested that traffic considerations should be taken into account while planning a Level III-TAX. So at such sites where C-DOT MBM exchange exists it will be prudent to include SBM-TAX in the MBM exchange itself as a Trunk BM. As there are other trunk BMs also in the exchange it will be possible to regulate the traffic on each trunk BM. This exercise will result in following surplus material —

1. IOPs (Two)
2. ADP
3. OMA
4. Iron work material

The procedure to install one additional BM is already available. After the addition of this BM, the MAX exchange can be converted into an ILT to cater for various routes on Level-0. All such routes on which charges are to be differentiated will be created in this exchange and for all such routes where the charges are same, will not be analysed in this exchange. However it will generate charging for all level-0 routes. The procedure to convert MAX into ILT is supported with a separate document.

8.9. CENTRALISED EXCHANGE MAINTENANCE SYSTEMS (CEMS)

Centralised Exchange Management System (CEMS) is a PC based software package developed by C-DOT for monitoring the C-DOT SBM/MBM Exchange from a Central Network Management Centre, thus reducing the maintenance cost and facilitate better planning and dimensioning of the network.

The CEMS functioning as a Remote exchange Maintenance Centre consists basically of a PC connected on a telephone line through modem. The CEMS software will be residing on the PC-AT. All the C-DOT SBM/MBM exchanges in the vicinity to be controlled, will also have a Modem connected to a telephone line from the respective SBM/MBM. This modem has a RS-232C link with the IOP of the exchange. The CEMS can thus initiate a telephone call to distant exchange Modem and can interact over the telephone line with the IOP of the exchange. In the PC, CEMS software runs over MS-DOS (V6.0) and WINDOWS (V3.1 own ward). IOP of the remote exchange to be monitored, must have RGEN (V6.0) utility loaded into it.

The salient features of CEMS are:

- Automatic Data Collection from Exchanges using scheduler facility.
- Post analyses of the stored data in various graphic representations using user friendly graphic user interphase.
- Collection of various category Alarms Report from exchanges.
- Remote Login facility to enter 'CRP' of IOP and executing any CRP command for Trunking, Routing, Subscriber Line Administration and all other exchange operations.
- Collection of Billing Data from the Remote exchange for preparing & monitoring Billing Record.

Chapter 9.

Conclusion

The format designed by C-DOT for holding these work shops, aims a free and frank exchange of information related to Installation, Operation and Maintenance of C-DOT switching equipment. C-DOT on the basis of feed back available from internal evaluation, evaluation of TEC and QA, Feed back available from manufacturers, data being logged at the C-DOT control room based on interaction with field units and the data collected by C-DOT Installation, Operation and Maintenance support team visiting the field sites has got a long list of irritants. These irritants need not necessarily be problems but do contribute to inadequate maintenance. C-DOT in its presentation during these work shops apprised the participants to all those irritants and the solutions to get around them. C-DOT also took care to progressively include the fresh feed back being given by participants in each of those workshops. It has been observed that as expected most of the problems, clarification or issues the participants had in mind were covered as a result of C-DOT's own treatise on these problems and lists of fresh problems being indicated by the participants had a diminishing count. C-DOT has felt that these workshops had been very helpful and as a result of large number of doubts being cleared. We have confidence that the participants will be able to Install, Operate and Maintain the C-DOT switching equipments much more efficiently than ever. We sincerely hope that this document will also help all those who will not be able to attend such a work shop.

Annexure 1

Creation of Special Service Numbers 100/197/198 in 256P RAX

Any special Service No. 100/197/198 etc. can be created in 256 RAX, using following steps :

1. Open Direction 1 as Special Service [<cnfg> <1> <1> <TGL>]
2. Configure one slot as RD (Ring Down) [<cnfg> <4> <1> <F:S>]
3. Insert CCM card in that slot.
4. Select one O/G type TGP (say 10) and change its line signalling as RD (Ring Down) [<TGP> <TGP No.> <3> <1>]
Change ROD = 0 in TGP-10 [<TGP> <TGP No> <5> <1> <1>]
5. Add two RD ports to this TGP 10 [<TGP> <TGP No.> <1> <F:S:T>]
6. Add one route NO. (say 10) to Direction 1, [<cnfg> <3> <1> <1>]
(Maximum '10' routes can be added to Direction '1').
7. Add TGP No. 10 to route No. 10 [<RUT> <Route No.> <1> <TGP No.>]
8. Add route code 100/197/198 to route no.10 [<RUT> <Route No.> <3> <1<100>]
9. Allow special service on subs. Nos.
10. Now connect telephones on the CCM ports which are allotted to the O/G TGP 10.
11. If any subscriber dials '100' ring will be extended on telephone connected to CCM ports and conversation will take place.
12. Special Service No. 100 can be defined as Emergency no. by configuring corresponding Route No. '10' by <Rut> <10> <7>
13. This way maximum '10' special service numbers can be opened in 256P-RAX.

Annexure 2

Over-Loading in Trunk / Line BM

Any BM in MBM exchange or SBM can go for over-Loading due to various reasons. Causes of Over-loading and action required in such cases is stated below:

Cause 1 : Actual Traffic Over-load

- ◆ BHCA handling capacity of a BM with CPU-S04/2Mb Mem cards is 7000, while it is 8500 with CPU-S05/2Mb Mem cards.
- ◆ BHCA capacity increases to 10,000 with the use of CPU-S05 and TME-16 MB (MEM) cards.
- ◆ To observe traffic pattern of any BM, start traffic report for "Line Reports" using command "Start-trf-rpt". Next day take traffic report for "Exchange-Performance" for the particular BM using "displ-trf-rpt". In this report the figure against parameter "Total Call Attempts" will give you the 'BHCA' during any 1 Hr period. By observing 'BHCA' for last 24 Hrs, we can have traffic pattern in the BM.
- ◆ The genuine over-load condition of a BM can be taken care by the use of Cpu-S05 & TME cards in place of CPU-S04/2MB Mem cards.
- ◆ In case over-loading is still existing, then there is no alternative but to reduce number of heavy callers from line BM or shift few trunks to other Trk BM in case of MBM exchange.

Cause 2 : Over-Loading Due to False Traffic

In case it is observed that over load condition of a Line BM or Trk BM occurs from 9 PM onward in the evening Hrs, when 1/3 rd or ¼ th STD Tariff rate starts, then this can be due to two reasons:

- ◆ No. of Trunks towards tax directions are not sufficient and as a result, false traffic due to repeated attempts on STD routes is generated. In this case, as an immediate relief, from over-load condition, few O/G Trunks in TAX direction can be added and traffic pattern can be observed. To calculate exact no. of trunks required on TAX direction, put TAX-TGP under traffic observation using "mod-tgp-obs" command. Then take traffic report for O/G trunk using 'displ-trf-rpt'. In these TGP reports for most busy Hrs, note down traffic in 'Erlongs'. If this Erlong figure is divided by

0.5, then this will give you the no. of trunks required in that particular TGP. Then the Trunks can be increased accordingly.

- ◆ No. of Trunks towards TAX direction is sufficient, but still over-load is there.

In this case, it is possible that calls are failing either due to individual channels/Trks. fault or some particular routes ungettable. Here individual channels/trunks can be blocked to improve call success rate and thus automatically reducing repeated attempts. If the calls are failing on individual routs, data creation should be checked at own end/distant end to rectify the fault.

Annexure 3

Problems Related To Route Inconsistencies

We will now discuss the route related inconsistencies. Usually route related inconsistencies are very much interlinked and it is not advisable to do modification file wise. If there is some inconsistency, which cannot be bypassed, then entire route related files are copied from BMDC and routes are created again. Before doing that note down the characteristics of all routes.

Procedure for copying from BMDC is as follows :

1. Bring SBY IOP to warm level by giving command <init-iop:2,1;
2. On this iop come out of crp by pressing ctrl+D
3. iop5x> cd \$GLBDATAP < >
4. iop5x> ls \${GLBDATAP}apdatb*>>xx
iop5x> ls \${GLBDATAP}aprtc*>>xx
iop5x> ls \${GLBDATAP}apoftg*>>xx
iop5x> ls \${GLBDATAP}aplvl1*>>xx
iop5x> ls \${GLBDATAP}iorttg*>>xx
iop5x> ls \${GLBDATAP}iotrcm*>>xx
iop5x> ls \${GLBDATAP}iortim*>>xx
iop5x> ls \${GLBDATAP}aprstr*>>xx
iop5x> ls \${GLBDATAP}aprtmx*>>xx
5. rm 'cat xx'
6. Insert BMDC cartridge in this iop
7. iop5x> cpio -icvu 'cat xx' <\$TAPE
iop5x> cd \$GLBDATAP
8. iop5x> mv apdtoe.dat xxx.dat
iop5x> mv apdtoe.idx xxx.idx
iop5x> mv apdtoe.lok xxx.lok
9. iop5x> cpio -icvu /data/exdata/glbdata/apdtoe* <\$TAPE

10. Create all routes (ordinary/special/DID) in growth mode and load bd which was taken from active IOP.
11.

```
iop5x>mv xxx.dat apdtoe.dat  
iop5x>mv xxx.idx apdtoe.idx  
iop5x>mv xxx.lok apdtoe.lok
```
12. Make this IOP in-service active after bringing mate IOP to warm start level.
13. Give init-sys:, part-init; Then bring the mate IOP in duplex.

Note:

If DID routes are not present step 8, 9 & 11 are to be skipped.

Annexure 4

Reasons of Initialisation Due to Software Recovery Counter Overflow

- ◆ Please make sure in data creation that there should not be indefinite loop, like digits are received in C-DOT exchange 'A' and we are passing these digits to exchange 'B'. Exchange 'B' gives back to C-DOT exchange and C-DOT exchange gives again to Exchange 'B', which makes an indefinite loop. In these type of cases recovery will come due to wrong creation of data. This can be avoided by allocating different TGP CTGRY for I/C TGPs.
- ◆ One of the reasons may be corruption of Annc. Data. Refer Annexure - 7 for the solution.
- ◆ Check system status or observe from OOD/printer whether some switch units (specially memory unit) going 'OOS-SUS' frequently. This may also be the cause for system to go for Recovery upto 'SBL-CLR' with SRF counter over flow. Force these units 'OOS-OPR' the system for stability. Bring these units INS-ACT/SBY after thorough DGN.
- ◆ Check whether any fresh data creation regarding 'Routes' or 'Trunks' has been done. Confirm the data creation with C-DOT control room. Otherwise, revert the changes done in Trunk & Route Data.
 - ◆ Verify I/C TGP category from Main TAX or TAXES other than one.
 - ◆ In case of SBM-TAX, all the I/C TGPs should be configured as "ORD" in the parameter 'TGP-Type'. Only O/G TGP towards Main TAX should be of T-TAX Type.
- ◆ Another reason of SRF counter O/F may be due to corruption of Trunking Data.
 - ◆ One of the solution is to load few days old 'Ed' in the active IOP at warm start level and then giving "part-init" to the system using 'init-mod' command.
If above solution is not feasible, then do following :-
 - ◆ List all the Trk Group Nos.
 - ◆ Choose first I/C TGP and make all the TENs OOS-OPR. Observe system for recovery. If there is none, then this, TGP is causing it. Isolate the TENs by making them 'INS' one by one, till recovery

starts again. Otherwise delete the complete TGP and Create it again.

- ◆ This way cover all I/C TGP's one after the other, till the trunks or TGP is isolated. Del/create TGP will solve the problem
- ◆ Once I/C TGPs have been found all ok, proceed to O/G TGPs, starting from TGP having heavy traffic. Block trunks one by one to isolate the faulty terminal. Then del/add **Trk** or del/cre **Tgp** will solve the problem.

Annexure 5

Procedure to Clear Held-up Alarms

Some times it has been observed that some alarms are generated and not cleared even if the fault is attended. In most of the cases making that particular unit OOS and INS solves the problem. In exceptional cases where it is still not cleared, the following procedure can be followed:

- i) Go to the IOP5X> prompt and create alm group using the following command (on both IOPs if they are in duplex).

```
IOP5X> ls $PRCDATAP/apalmp* >$GRP/alm.grp.
```

- ii) Now go to crp and issue the following command (on both IOPs if they are in duplex).

```
<DEL-FGP-FILE:;alm;
```

- iii) Now give following command on any of the INS IOP, to initialise the system up to part-init:-

```
<INIT-SYS:;5; in case of SBM and
```

```
<INIT-MOD: AM, 5; in case of MBM.
```

This will clear the pending alarms.

Annexure 6

Problem Related to Corruption of apdtkr.bin File in 1_4

It has been observed in SBM Exchange having S/W Link 1_4, Whenever system goes for **data loading**, it fails to recover. The last file displayed while data loading is:

/data/exdata/prcdata/apmodl.bin

Next file to be loaded is:

/data/exdata/prcdata/apdtkr.bin, which gets corrupted.

Note : **Do not give reset to BPs at this stage.**

The solution of this problem is given below:-

1. Bring the active IOP to warm start level.
2. Check disk space and create free disk space in both IOP's if required.
3. In last active IOP, give following commands:

- ◆ IOP5x> cd \$PRCDATAP
- ◆ IOP5x> mv apdtkr.bin oapdtkr.bin
Insert BMDC cartridge in the cartridge drive.
- ◆ IOP5x> cpio -icvu /data/exdata/prcdata/apdtkr.bin <\$TAPE.

The file copied and total no. of Blocks of BMDC, will be displayed.

- ◆ Remove BMDC cartridge from cartridge drive.
- ◆ IOP5x> ls -ls apdtkr.bin

This will display the file apdtkr.bin

4. Go to crp and give command <init-iop:5,1; As soon as the IOP becomes INS-ACT, the remaining files will get downloaded and system will recover.

Annexure 7

BM Going For Frequent Initialisation At 'SBL-CLR' Level in S/W Link 1_4

One of the probable cause of BM going for repeated initialisation in 1_4 S/W is the corruption of announcement data. Recovery type shown on BP terminal is “Code 175 with parameters 172h, 0h, 601h”.

In such a case, do following:-

1. Unequip and equip Annc Card in on-line mode using crp commands “uneq-srv-card” and “equip-srv-card” in the affected BM or SBM. 'Put-SWU-INS' for ANNC.
2. On active IOP, check following

IOP5x> conp

conp> m x [where x = (2 * BMNo.)-2]

MDEB x > md 474ad0 [In case of MBM]

OR

> md 592b5c [In case of SBM]

Note down 1st four bytes.

If first four bytes show xx000900 (where xx is logical BM No.), then this is correct.

If first four bytes show xxxfff00, then this is corrupted. Modify these bytes, using :-

MDEB x> exm.l 474ad0 [For MBM]

OR

> exm.l 592b5C [For SBM]

Press space bar and type xx000900.

Give Return & Type '.'

MDEBx > ex

CONP > ex to come to iop5x> prompt

3. Give following command in crp

<mod-annc-tone

[BM No.] = x (where x varies four 1 to 32)

[SW-mapping] = fac_na_annnc - fac_na_annnc

[OOS-mapping] : fac_na_annnc - nut

4. mod-sys-param : fac_na_annnc, 450;
5. Then verify Announcement “This facility is not available on this Number” by dialling STD No. from a 'NON-STD' subscriber No. belonging to SBM/affected BM.

Annexure 8

IOP Synchronisation Failure - Cause & Remedies

IOP synchronisation in C-DOT may fail due to various reasons. There are 6 steps of IOP synchronisation. Various files updated in OOS-IOP from INS-ACT IOP are lying in PRCDATAP directory by the name of sync_grp x (where x takes values from 0 to 5) Each sync group file contains, different type of data files to be 'updated' in OOS-IOP to bring it in sync with the INS-ACT IOP. It may happen that certain file is not getting updated within prescribed time limit and as a result sync process will be aborted in that particular step to which the file belongs. During sync, various steps of “Sync over” messages will be displayed on console terminal, ood-terminal & printer also. Most likely, the exact file name will be flashed on console terminal just before “Sync-Abort' message. Then some action is required regarding that particular file before repeating the sync procedure again. In case no file is shown on console before 'sync_Abort' message, still particulars of failure can be seen through 'sync_log' file in \$DUMPP directory, using following commands in ACT-IOP:-

```
IOP5x> cd $DUMPP
```

```
IOP5x> tail -50 sync-log
```

from this note down the name of file, just before the “sync-abort” message and take appropriate action as stated in the subsequent paras 1 to 7.

GENERAL PRECAUTION

Before synchronisation, do delete unwanted files (after taking desired Back-ups) as per standard procedure for Disk-cleaning e.g. ioh, trnsf, bc, tf groups giving appropriate date options in bc & tf. Also run utility 'cre-space' in both the IOP's. As far as possible synchronise the IOP's during slack hours.

1.

- ◆ After giving 'put-swu-ins' command from Active IOP, message “**synchronisation of IOP begins**” does not appear on console terminal and process creation does not start on OOS-IOP, then, most likely HDL card of one of the IOP is faulty. Try by replacing HDL card first in OOS IOP and then in Active IOP.

- ◆ Process creation has started on OOS-IOP (4 lines) but ‘synchronisation of IOP begins” message does not appear on ACT-IOP console, then verify s/w loaded in the IOPs. These may be different.
2. “Synchronisation of IOP begins” has appeared but sync is getting aborted in step 0 itself (i.e. “**sync over for step 0**” is not coming). Do following:
 - ◆ Run utility cre-space in Active IOP.
 - ◆ If 'cre-space' is not available, then give commands :


```
IOP5x > cd $TEMP
```

```
IOP5x> mv oodlogDD noodlogDD
```

where 'DD' stands for current date

```
IOP5x> rm oodlog* result*
```

```
IOP5x> mv noodlogDD oodlogDD
```

```
IOP5x> > oodlogDD [DD is current date]
```
 - ◆ Shutdown and Reboot ACTIVE IOP (using init_iop:2,1; & init-iop:1,1; then make it INS-ACT (init-IOP: 5,1),
 - ◆ start synchronisation again (put-swu-oos/put-swu-ins)
 3. **'Sync-Abort' in step 1**

Note down the file name in sync_log file in \$DUMPP directory. If it is a traffic file then delete 'tf' grp till current date and synchronise again. However if 'file' is other than traffic related, then contact C-DOT Control Room for further action.
 4. **Sync-Abort in step 2**

Repeat sync in late night hours, when no traffic is there. Before synchronization, bring Active IOP to Cold Start (using INIT-IOP:2,1; and INIT-IOP:1,1;). Reboot IOP and make it INS-ACT, by init-iop:5,1; command.
 5. **Sync-Abort in step 3**

In this step all Ed files are transferred. Note down the file name and consult CDOT Control Room for further action, as 'ed' files are difficult to handle. In some cases, 'copy-in' old Ed in the active IOP in warm start level and then make it active again. Then give "part-init” and start sync. process again.
 6. **Sync-Abort in step 4**

Run 'cre-space' in Active IOP. If 'cre-space' is not available, then give following command in active IOP:-

```
IOP5x> find /u -name *.log - print
```

Note down the directory and *.log file names.

Then go to the particular directory and remove log files by giving full names.

```
IOP5x>rm abc.log etc. [where abc.log is the file name]
```

```
IOP5x>cd $TEMP
```

```
IOP5x>rm result*
```

```
IOP5x>cd $FDTDIR
```

```
IOP5x>rm heal*
```

Now give 'softstart' to the system, using <init-sys command, in crp mode.

i.e. <init-sys :, Soft-Start;

After System has recovered fully, repeat the synchronisation procedure.

7. **Sync-Abort in step 5**

This is the most probable step of sync failure. In this step, all “Detail Bill Files”, “traffic files” and all “oodlogxx” files are transferred. Normally, by deleting previous 'tf' and 'bc' files will solve the problem.

Otherwise, note down exact file name in 'sync_log' file in \$DUMPP directory. Then delete that file using <del-fgp-file command. Remove all 'oodlog' files in \$TEMP directory, as mentioned in para 2.

Then repeat the synchronisation process.

Annexure 9

IOP Failure During Interchange

In a duplex IOP configuration one of the IOPs will be in INS-ACT state and the other will be INS-SBY. Though both IOPs in a duplex configuration are physically connected to both the APs/BPs through HDLC Links (HDL0&1), only INS-ACT IOP will be able to communicate to INS-ACT AP/BP. But all updations which are occurring on the INS-ACT IOP will be performed on the INS-SBY IOP also. This is done by the INS-ACT IOP through the IOP to IOP HDLC link (HDL-3). The operator commands which are initiated from the INS-SBY IOP get routed through the INS-ACT IOP to AP/BP, if the command requires communication with AP/BP.

INTERCHANGE TO IOP

- ★ Say at any time IOP-0 'INS-ACT' & IOP-1 is ins-SBY and AP-1/BP-1 is active and AP-0/BP-0 is INS-SBY. It means, IOP-0 (HDL-1) and IOP-0 (HDL-3) and IOP-1 (HDL-3) are coming into picture HDL-3 for exchange working.
- ★ As soon as interchange of IOPs is given, IOP-1 tries to establish link between AP-1/BP-1, on its HDL-1 port. If HDL-1 of IOP-1 is not healthy or HDY-1 cable is bad or AP-1/BP-1 CPU card is not OK, then IOP-1 will fail and go to OOS-SYS state. As a result IOP-0 will become INS-ACT again.

For this following action can be taken

- i) change HDL card of IOP-1 [OR loop back Test can be done on HDL ports to verify]
- ii) change CPU card of AP-1/BP-1
- iii) change HDY-1 cable between IOP-1 and AP-1/BP-1
- or
- iv) If fault is not rectified by any of the above actions, then fault is in the BP-motherboard or IOP's motherboard

★ In case of interchange of BPs, if the existing active IOP-0, fails and becomes OOS-SYS, then the link between IOP-0 and AP-0/BP-0 is not OK at its HDL-0 port. Here also there can be three possibilities :

1. HDL card of IOP-0 is not OK (for HDL-0)
2. AP-0/BP-0 card is not OK for IOP-0
3. HDX-0 cable is faulty.

So by replacing the items one by one, fault can be rectified (Provided fault is not in the mother-board).

Annexure 10

In MBM Exchange, BM Not Recovering on its Own from Critical Status

In MBM exchange, BM3 (say) has suddenly become critical and not recovering of its own. Various possibilities and action to be taken in each case are stated below:

- (A) Due to some transient fault in PSUs of TSU of BM3, reloading may not start again. Simply switch OFF/ON both the PSUs in TSU frame only. Give reset to all the controller cards of TSU. Wait for data loading to start BM will recover after SBL-CLR.
- (B) In case BM3 has not recovered by action under 'A', then there can be following possibilities:
 - 1. Check S/W status for IFC2 and IFC18. In case one IFC say IFC18 is OOS-SYS, then BUS-1 is not through that time.
 - 2. In BM-3, TSC-0/TSS0 cards are faulty or clock/data cable of BUS-0 (between TSC-0 & IFC2) is having some fault or IFC2 itself is fault for BM3 only. Any one of these faults will make the BUS-0 connectivity between BM-3 & CM ineffective.

Thus the result of (1) & (2) will be that BM-3 can not go for loading at this time.
 - 3. In this case, it is possible that CMS-1 (MSC/MSD) is faulty.

ACTION REQUIRED

Force IFC-18 card INS-ACT, thus making BUS-1 through between TSC-1 & IFC-18. Loading of BM-3 will start immediately and BM-3 should recover after 'SBL-CLR'. Then during slack hours of traffic BUS-0 connectivity between BM-3 and CM has to be ensured by replacing one of cards viz. TSC-0/TSS-0/IFC2/CMS-1.

- (C) BM-3 does not recover by actions taken under (B), then switch OFF/ON PSUs in BPU frame. Give reset to BP-0 & BP-1 and let BM-3 go for code/patch/data loading.

PREVENTIVE MAINTENANCE FOR ALL THE BM's IN MBM EXCHANGE

To avoid such situations at random, preventive maintenance will be useful and should be carried out for all the BMs one by one. Taking example of BM-3 & BM-4, do following during night hours:

1. Force 'IFC2' OOS. BM 3 becomes 'critical' and does not recover of its own, then fault is in BUS-1. Switch off COPY-1 PSU in TSU of BM-3. Replace TSC/TSS cards one by one & switch on PSU. Reset all controller cards in COPY-1 of TSU. Data Loading should start. Mark the removed cards as 'faulty'.
2. If data loading does not begin after replacing TSS/TSC cards, then fault may be in IFC-18. Force IFC2 INS. BM-3 will recover, Force IFC-18 OOS and replace with good card, after verifying jumper setting. Bring it INS-ACT. Again force 'IFC-2' OOS. BM should remain stable. In this case mark removed IFC18 (SSM) card as 'Faulty'.
3. In case, BM-3 again becomes critical after replacing IFC 18 card also (when IFC 2 is OOS), then fault is with CMS-2. Replace MSD/MSD cards in CMS-2. BM-3 should recover after data loading.
4. In case loading is still not starting, then it is possible that clock is not getting through. First interchange 'SS' plane. If still loading not possible, replace clock cable/data cable of BUS-1 (between TSC-1 & IFC18). BM should recover.
5. In case BM3 & BM-4 remain stable after forcing out IFC2', then repeat the exercise by forcing OOS IFC-18. BMs should remain stable. However if one of the BM becomes CRITICAL and does not recover, then start diagnostics for BUS-0 fault as explained in step 1 to 4 above. In this case cards involved will be TSC-0/TSS-0/IFC2/CMS-1.

Annexure 11

Reasons of Call Failure

In case a call is failing (Local call or a route call), the cause of call failure can be established by putting the call no. on observation for 'Originating Call' and then checking its 'Call Detail Record' (CDR). For this, use crp command 'mod-sub-obs' to put the calling no. on 'originating observation'. Then make some calls from the calling no. CDR will be generated for these calls, which can be displayed using command 'displ-cdr'. In that CDR, watch for the field "Call Status". After decoding the message written in this field, we can guess the probable reason of call failure. Meaning of the call status field values are given below:

- | | |
|-----------------------|---|
| 1. 162_TST | - 162 line test service. |
| 2. ABANDON | - Call abandoned. |
| 3. ABS_SRVC | - Absentee service. |
| 4. ACB_RING_OUT | - Auto Call Back Ring Time Out. |
| 5. ACCESS_BARRED | - Access Barred. |
| 6. ADDRESS_INCOMPLETE | - Address Incomplete. |
| 7. ADMN_BSY | - Subscriber Admin Busy. |
| 8. ALARM | - Alarm offered as a waiting call did not mature (No longer in use) |
| 9. ALM_MON | - Alarm monitoring. |
| 10. ANI_N_PSBL | - Automatic Number Identification not possible. |
| 11. BILL_NOT_PAID | - Call failure due to Bill not Paid. |
| 12. BLOCKING | - Blocking on the route. |
| 13. BSY_TO_PSBL | - Busy & Trunk Offer Possible. |
| 14. BW_SGN_ABSENT | - Backward Signalling Absent. |
| 15. BW_SGN_PRMNT | - Signalling Fault-Backward Signalling Permanent. |
| 16. CALL_FAILURE | - Call failed due to Circuit supervision activity |
| 17. CALL_KILLED | - call failure due to kill call command |
| 18. CALL_WT_CLNG | - Failure due to Call Waiting at the calling party. |

19. CALL_WT_IND_TM_OUT	- Call waiting Indication time out.
20. CHNGD_NUM_ANNC	- Changed Number Announcement.
21. CHNL_CONGESTION_REMOTE	- Failure due to channel congestion at RBM.
22. CHNL CONGESTION	- Failure due to congestion in Channel in DTK for origination at RBM.
23. CLLD_BNP_OOS	- Called Party OOS due to Bill not paid.
24. CLR_IMM_PRTY_A	- Clear Immediately Party A.
25. CLR_IMM_PRTY_B	- Clear Immediate Party B. /* SHELJA
26. CONCKT	- Conference circuits
27. CONG_TRNK	- Congestion on Trunk.
28. CONGN_LN_GRP	- Congestion in Hunt group.
29. CONV_TM_OUT	- Conversation Time Out.
30. CP_BSY	- Subscriber CP Busy.
31. CSH_TM_OUT	- Called Subscriber Held Timeout.
32. DBE	- Dial By Eqn,
33. DT_TM_OUT	- Dial tone time out.
34. DUAL SEIZURE	- Dual Seizure of a trunk.
35. FAC_N_IMP	- Facility Not Implemented.
36. FAULTY_CKT	- Faulty circuit.
37. FL_AS_DIVERSION_NOT_POSSIBLE	- Diversion not possible.
38. FTR_CNCL	- Feature cancelled.
39. FTR_INTERACTION	- Feature Interaction-
40. FTR_INVC	- Feature Invocation.
41. FW_SGN_PRMT	- Forward Signalling Absent.
42. IDT_TM_OUT	- Inter Digit Time Out.
43. INV_INVC	- Invalid Invocation.
44. INV_SGN	- Invalid Signalling.
45. IW_CODE	- Wrong Prefix Digit.
46. JN_FAULTY	- Junction Faulty.
47. KIL_TRK_L2	- Killer trunks level 2
48. KIL_TRK_LL	- Killer trunks level 1

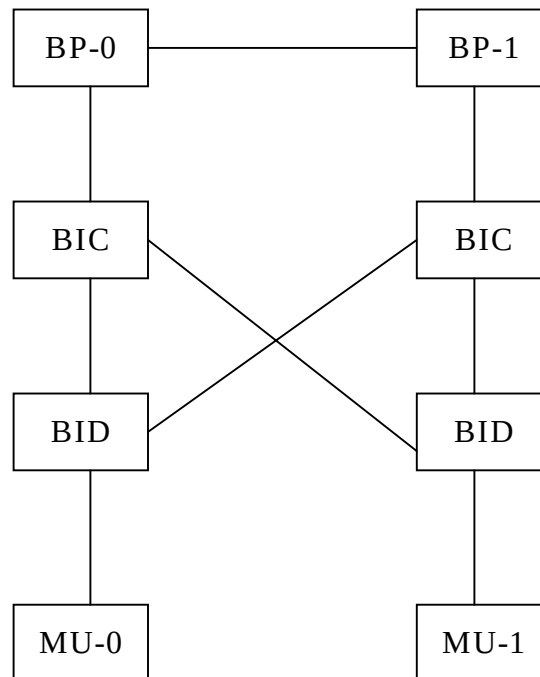
49. LINE_SGN_FAILURE	- Line signal failure. This could be due to loopback removal.
50. LLO	- Line Locked Out.
51. MH_TM_OUT	- Manual Hold Timeout.
52. MTCE_BSY	- Subscriber Maintenance Busy.
53. NO_DIAL	- No digits dialled.
54. NO_SEIZURE_ACK	- No seizure ack received.
55. NU	- Called Number Unobtainable.
56. OG_RSTRCTN	- Outgoing Restriction.
57. OVERLOAD	- Call failure due to overload detection.
58. PART_DL	- Partial Dialling
59. REMOTE_CONGN	- Remote Congestion.
60. RING_OUT	- Ring Time Out.
61. ROUT_OUT_ORDR	- Route out of order.
62. ROUT_RECNT_CHGNG	Route Recently changed.
63. RSRC_N_ALCTD	- Resource Not Allocated-Shortage of service circuits..
64. RSRC_N_AVAIL	- Resource Not Available.
65. SGN_FAILURE	- Signalling Failure.
66. SPURIOUS_ANS	- Spurious ans received on the trunk.
67. SS_BLOCKING	- Space Switch Blocking.
68. ST_COND	- End of dialling received.
69. SUCC_CALL	- Successful Call.
70. SWTCH_BLOCKING	- switching Blocking.
71. SYS_REC	- System Recovery.
72. TO_N_PSBL	- Trunk Offer Not Possible.
73. XCHG_INVC	- Exchange Invocation.

Annexure 12

Diagnostics of Memory Unit

Whenever any memory unit goes 'oos-sys', then it should be brought 'INS-ACT' after proper diagnostics. In some cases, 'DIGNOSIS O.K. Report is not sufficient. Memory may still go oos-system, when we try to bring it INS, after Diagnostic OK report has come. How to handle memory units in various cases has been discussed below :

Memory units have links with both the BPs.



Each BIC & BID card is provided with direct as well as cross port, so as to enable each BP to have access with its own memory (self port) as well as the other memory (cross-port).

For example MU-1 has gone oos-sys, then following action is required to bring it INS-ACT :

Case 1 : Say BP-0 is INS-ACT & BP-1 is INS-SBY. Then diagnose MU-1 using 'DGN-SWU' command.

In case Diagnostics Report is Ok for MU-1, then give 'interchange' command for BP, to make BP-0 as INS-SBY. Diagnose MU-1, again. In case DGN is ok with BP-0 also, then bring the memory INS using 'PUT-SWU-INS' command.

Case 2 : In case, DGN is failing with one BP (whichever is SBY), then note down 'card id' in case of 2MB cards. Replace that card and repeat the diagnostics. Go on replacing card as shown under DGN report, till DGN comes ok (in case of TME only one card replacement is required). If DGN is failing, despite changing all cards (BID+MEM), then fault may be in BIC card of the SBY-BP. Replace BIC card also and repeat DGN. It should pass now. Repeat DGN with other BP and bring the mem INS-ACT.

Case 3 : DGN of MU-1, is passing with both BPs, when MU-1 is brought INS, using 'PUT-SWU-INS' command 'result fail' report comes and MU-1 remains in 'OOS-OPR' status. In such a case, it is possible that one or more memory cards are failing under updation during 'PUT-SWU-INS' action. In such a situation, MEM cards are to be replaced one by one and MU-1 brought INS using 'PUT-SWU-INS' command, till MU-1 becomes INS-ACT.

Case 4 : DGN of MU-1 is passing with both BPs, but 'PUT-SWU-INS' command fails. Then the whole set of MU-1 has been replaced by good ones, even then MU-1 is not coming INS. In this case, fault may be in the ACTIVE memory unit (MU-0), in one card or more than one card. It will be best to replace MU-0, completely with good set of memory cards. For this BM has to be switched off and after replacing MU-0 cards (BID + MEM or BID + TME), BPU & TSU are switched on. Give reset to all controller cards and let BM go for code/patch data loading. Once system recovers, then try to bring MU-1 INS ACTIVE, by standard procedure as discussed in step 1.

Annexure 13

Detail Bill Files (BC Group) Management

The system creates one file for each day of the year to which entries of the STD calls done by subscribers are made. Thus for 365 days of the year there would be 365 files. These files have date and month stamps but no year stamp.

Failure to do regular disk cleaning can lead to a situation where data corresponding to two identical dates of two consecutive years is present on the disk in one file. Thus data corresponding to 1.5.98 would get appended on the data of 1.5.97 already present on the disk. When detail bill records of 1.5.98 are sought to be displayed, the records of 1.5.97 will also be displayed intermixed with those of 1.5.98. This will lead to discrepancies as the total calls made during the billing cycle will be less than the sum of units shown for the STD calls in the Detailed Bill for that period. Thus by regular disk cleaning, this situation will never arise.

Solution : To avoid such a situation, it is recommended to delete all previous files from the date of commissioning to the present date (After taking back ups). For example if the excahnge was commissioned in 15.7.97 and this command is being executed on 15.4.98 and it is desired to keep one month billing files, then execute from CRP,

```
<del-fgp-file :, bc{15-7-97 —> 15-3-98} ;
```

This will delete all previous files. The cleaning should be done every fortnight (after taking required backup) taking care that no day is left uncovered to avoid overlapping of the detailed bill records.

Important : Keep it as a practice to regularly take back-up & delete the old files. The periodicity may vary from 15 days to 3 months depending on the no. of cartridges available, billing cycle, disk space consumption etc.

Annexure 14

Guide Lines for No. of TGP's and Routes to be put under Observation Simultaneously

For SBM, there is no restriction on no. of Routes and TGPs to be kept under observation simultaneously.

For MBM, following table indicate no. of Routes and TGPs that can be put under observation simultaneously :

Configuration	No. of BMS	No. of Routes under Obs.	Max. No. of TGPs under Obs.
MBM-L	Upto 5	Upto 50	40
		51 to 80	35
		81 to 90	30
		91 to 100	10
		101 to 110	0
	Upto 8	Upto 30	40
		31 to 40	35
		44 to 45	30
		46 to 50	10
		51 to 54	0
	Up to 12	Upto 15	40
		16 to 25	30
		26 to 30	10
		31 to 35	0
		Upto 15	40
	13 to 16	16 to 21	30
		22 to 27	0
		Upto 15	40
		16 to 21	30
		22 to 27	0
MBM-XL	Upto 24	Upto 24	40
		25 to 27	10
		28 to 30	0
	25 to 32	Upto 18	40
		19 to 21	10

Annexure 15

Limits for Subscriber Line Parameters

The limits of insulation resistance, loop resistance and capacitance for different line categories of subscribers are shown in the table below.

The line category of the subscriber has to be assigned depending on the values of insulation resistance capacitance and loop resistance. These may vary depending on the instrument connected. Normally category 2 can be used for DTMF instruments. The default limiting values for different categories are listed below.

Category	Insulation Resistance (Low) in kohms			Insulation Resistance (High) in kohms		
	a & gnd	b & gnd	a & b	a & gnd	b & gnd	a & b
1	20.0	20.0	20.0	20000	20000	20000
2	20.0	20.0	20.0	20000	20000	20000
3	20.0	20.0	20.0	20000	20000	20000
4	20.0	20.0	20.0	20000	20000	20000
5	20.0	20.0	20.0	20000	20000	20000
6	20.0	20.0	20.0	20000	20000	20000
7	20.0	20.0	20.0	20000	20000	20000

Contd..

Category	Capacitance (micro farade)		Loop Current (milli Amps)		Loop Resistance (ohms)	
	LOW	HIGH	LOW	HIGH	LOW	HIGH
1	1.5	3.0	20.0	36.0	100.0	2400
2	0.15	3.0	15.0	36.0	100.0	3200
3	1.5	3.0	20.0	36.0	75.0	2400
4	0.15	3.0	15.0	36.0	75.0	3200
5	1.5	4.0	15.0	36.0	100.0	3200
6	0.15	4.0	13.0	36.0	100.0	3600
7	1.5	8.0	20.0	36.0	100.0	2400

Note : *If external voltage on the line is more than 5.99 volts. no other tests will be conducted.*

Limits for Dial Tests

5th closing high	60 msec
5th closing low	16 msec
5th opening high	100 msec
5th opening low	42 msec
Dial Ratio high	4
Dial Ratio low	1
Dial Speed high	12 IPS
Dial Speed low	8 IPS

Annexure 16

Prevention of Damages due to Lightning by Correct Grounding of Inverters

There has been incidents of lightening affecting RS-232 interface in the IOP controller card and serial interface card interconnecting IOP and VDU. Wrong earthing of inverters results into voltage surge affecting the digital ground, which further causes damages to IOP cards, VDUs and printers etc. In order to prevent such damages, C-DOT recommends following modifications :

1. Inverters working on –48V exchange DC, must be provided for feeding AC to VDUs & printers instead of using commercial mains supply.
2. The inverter should be DOT QA approved and should have over voltage protection at the output.
3. The chasis ground of Inverters, should be connected to DC Earth Plate, instead of AC Earth Plate.

Note : Refer figure 1 for correct grounding scheme for inverters, VDUs, IOP & printers.

Fig.1

Annexure 17

Concentration of one DTU with another DTU Frame in SBM Exchange

In the present configuration, SBM-RAX exchanges support either pure analog trunks or a combination with 2 PCM streams. As transmission media is being upgraded, requirement for supporting more digital PCMs in SBM-RAX and 256P RAX was felt.

Most of the SBM-RAX exchanges are working as Group Dialling Exchanges with a number of 256P-RAX exchanges parented to each. This has necessitated the provisioning of more than 4 PCMs (i.e. more than one DTU) in such exchanges. As DTU cannot be concentrated, if all the Trunks are to be assigned, then this would result in reduction of Subscriber Line Capacity (Refer Fig. 1).

In addition, since atleast one PCM has to be allocated between GDC and 256P-RAXs, the 30 channel PCM would remain under-utilised in most of the cases as only 8-10 trunks are normally sufficient between SBM & 256P-RAX for optimising the use of the PCMs, it is thus suggested that the additional DTU may be concentrated with the existing DTU (Fig. 2) to achieve a total of 8 PCM systems. The other three TUs can be concentrated as usual to equip 1480 lines. These 8 PCMs will actually share only 120 time slots (channels). Also it is not mandatory to equip all the 4 PCMs in the concentration DTU. While creating TGP data, care should be taken to assign only the required number of circuits in each trunk group. There is no restriction on the number of circuits in a TGP as long as the total number of assigned channels does not exceed 120.

Fig. 1 & 2

Annexure 18

List of Approved C-DOT Manufacturers

For SBM-RAX and MAX-XL

Sl.	Manufacturer	Phone	Fax
1.	Bharat Electronics Ltd., <i>Works</i> Maj. V.S. Rawat DGM (D&E) Govt. of India (Ministry of Defence Enterprise) Balbhadrapur, Kotdwara Distt. PAURI GARHWAL 246 149 <i>Corporate Office</i> Dr. V.K. Koshy CMD Trade Centre, 116/2, Race Course Road BANGALORE 560 001 <i>Delhi Office</i> Mr. R.K. Maratha DGM (CM) Scope Complex, Core 6, Floor 6, Lodhi Estate NEW DELHI 110 003	01382-31112 01382-31171 to 78 080-222626 011-4360706 011-4360705	091-1382-31132 091-1382-31156 091-80-2258410 091-80-2261210 091-11-4364401
2.	Bharat Heavy Electricals Ltd., <i>Works</i> Mr. V.K. Bhatnagar General Manager Mr. N. Sabesan Product Manager (Telecom) Electronics Divn. (EDN) P.B. No. 2606, Mysore Road BANGALORE 560 026 <i>Corporate Office/Delhi Office</i> Mr. K.G. Ramchandran CMD BHEL House, Siri Fort Rd. NEW DELHI 110 049	080-6610153 080-6998210 080-6674297 080-6998447 011-6493008 011-6493031	091-80-6612780 091-80-6610137 091-11-6493021
3.	Crompton Greaves Ltd., <i>Works</i>	080-4252206	091-80-

Sl.	Manufacturer	Phone	Fax
	<i>Works</i> Mr. G. Govindappa Vice President Public Switching & Transmission B/2, KEB Layout, I Main, Bannerghatta Road BANGALORE RURAL 562 106	080-425206 080-425208 080-6683969	091-80- 425205
	<i>Corporate Office</i> Mr. K.K. Noharia MD 1, Dr. V.B. Gandhi Marg, MUMBAI 400 001	022-2676610	091-80- 2625844
	<i>Delhi Office</i> Mr. Manjeet Singh Vice President Vandhana Bldg, 11, Tolstoy Marg NEW DELHI 110 001	011-3711112 011-3730918 011-3739903	091-11- 3737617
4.	Electronics Corporation of India Ltd., <i>Works</i> Mr. P. Appaji Rao Head (Telecom Div.) Computer Group ECIL P.O., HYDERABAD 500 062	040-7123778 040-7120131 Extn. 3234	091-40- 7121897 091-40- 7123778
	<i>Corporate Office</i> Dr. C. Rao Kasarabada CMD ECIL P.O., HYDERABAD 500 062	040-7121055 040-7120131	091-40- 7122535
	<i>Delhi Office</i> Mr. K.S. Mittal DGM Palicak Bhavan, Sector-3, R.K. Puram NEW DELHI 110 022	011-6889848	091-11- 6874174
5.	Gujarat Narmada Valley Fertilizers Co. Ltd., <i>Works</i> Mr. A.L. Vidyasagar Exe. Director Mr. K. N. Pathak Senior Manager P.O. Narmada Nagar Distt. BHARUCH 392 015	02642-47001 02642-47002	091-2642- 47116
	<i>Works</i> Mr. A.M. Bhardwaj	02642-47129	091-2642- 47057

Sl.	Manufacturer	Phone	Fax
	MD P.O. Narmada Nagar Distt. BHARUCH 392 015		
	<i>Delhi Office</i> Mr. S.K. Gokia DGM A-1/288, Safdarjung Enclave (Near Kamal Cinema Complex) NEW DELHI 110 029	011-670117 011-6172678	091-11- 6196863
6.	Hindustan Teleprinters Ltd., <i>Works/H.O.</i> Mr. S.S. Shekhawat SGM (R&D) G.S.T. Road, Guindy CHENNAI 600 032	044-2326171 044-2328791 to 98	091-44- 2320340 091-44- 2327162
	<i>Corporate Office.</i> Ms. Lakshmi G. Menon CMD G.S.T. Road, Guindy CHENNAI 600 032	044-2341589 044-2321589	091-44- 2320340 091-44- 2327162
	<i>Delhi Office</i> Lt. Col. Pushish Srivastav DGM (Cordination & Dev.) 8/19, WEA, Smile Chamber IInd Floor, Karol Bagh NEW DELHI 110 005	011-5712201	091-11- 5781061
7.	Indian Telephone Industries Ltd., Bangalore (Electronic City Unit) <i>Works</i> Mr. K.K. Sundaram General Manager (EC) 18th Km Hosur Road, Hebbagodi Post BANGALORE 561 229	080-8520163 080-8520080 Extn 260 080-8520475 080-8520969	091-80- 8520475 091-80- 8521082
	<i>Corporate Office</i> Air Comde. S.S. Motial (Retd.) CMD 45/1 Magrath Road BANGALORE 560 025	080-5566366	091-80- 5593337
	<i>Delhi Office:</i> Mr. Mahesh Chandra Executive Director I-Floor, Core No. 6, Scope Complex, 7, Lodhi Road NEW DELHI 110 003	011-4360555 011-4368685 011-4362385	091-11- 4362666
8.	Instrumentation Ltd., <i>Works</i> Mr. A.S. Lodha	0744-421171 0744-423381	091-744- 424322

LIST OF APPROVED C-DOT MANUFACTURERS

Sl.	Manufacturer	Phone	Fax
	GM (Telecom) Jhalawar Road, KOTA 324 005	0744-424591 Extn:596	091-744-422505
	<i>Corporate Office</i> Mr. N.K. Sinha CMD Jhalawar Road, KOTA 324 005	0744-426914 0744-424476	091-744-424322 091-744-422505
	<i>Delhi Office</i> Mr. G.C. Goel Sr. Manager (Mkt.) Core No. 6, 7th Floor, Scope Complex, 7, Institutional Area, Lodhi Road NEW DELHI 110 003	011-4360882 011-4364605	091-11-4360905
9.	Kerala State Electronics Dev. Corpn. Ltd., <i>Works</i> Mr. N. Ravindranath Exe. Director Communication Division Switching Eqpt. Unit Keltron Equipment Complex Monvilla, Kulathoor P.O. THIRUVANANTHAPUAM 695 583	0471-418948 0471-418942	091-471-418984
	<i>Corporate Office</i> Mr. Satish Kumar Managing Director Keltron House, Vellayambalam, THIRUVANANTHAPURAM 695 033	0471-320621	091-471-320176
	<i>Delhi Office</i> Mr. T.G. Menon GM Travancore House, K.G. Marg NEW DELHI 110 001	011-3381730 011-3388625 011-3383689	091-11-3389313
10.	Punjab Communications Ltd., <i>Works</i> Mr. Dinesh Sharma AGM, HOD (Switching) C-134, 135, Phase VIII, Industrial Area, S.A.S. Nagar MOHALI 160 059	0172-677627 0172-263901	091-172-671492 091-172-675468
	<i>Corporate Office</i> Mr. A.S. Gill M.D. C-135, Phase VIII, Industrial Area, S.A.S. Nagar MOHALI 160 059	0172-670659 0172-670516	091-172-671492 091-172-675468
	<i>Delhi Office</i> Mr. R.S. Singla B-50 Anand Vihar, NEW DELHI 110 092	011-2202789	

Sl.	Manufacturer	Phone	Fax
11.	United Telecoms Ltd., <i>Works</i> Mrs. Padma Rao Director 18A/19, Doddana Kundi Indl Area, Phase-II Mahadevapure Post BANGALORE 560 048 <i>Head Office</i> Mr. C. Basavaburnaiah Chairman 777G, 100 Feet Road, HAL IInd Stage, Indranagar BANGALORE 560 008 <i>Delhi Office</i> Mr. Rajiv Kalra General Manager (Mkt.) Flat No. 1-D, White House, Mandi House 10 Bhagawan Dass Road NEW DELHI 110 001	080-5294425 080-5294426 080-5294427 080-8511176 080-8511883 080-8510728 011-3382212 011-3382213	091-80-5263075 091-80-8511264 091-11-3382213

For SBM-RAX Only

Sl.	Manufacturer	Phone	Fax
1.	Gujarat Communications & Electronics Ltd., <i>Work</i> Mr. Avtar Singh Sr. Manager A-42, GIDC Elect Estate, Sector-15, GANDHINAGAR 382044 <i>Corporate Office</i> Mrs. Vilasini Ramachandran MD GIDC Industrial Estate, Makarpura BARODA 390 010 <i>Delhi Office</i> Mr. P.K. Duggal Sr. Manager XVI/681, Gauri Bhawan-II, Faiz Road, Karol Bagh NEW DELHI 110 055	 02712-23244 02712-21630 02712-22919 0265-643521 0265-643121 011-7513320 011-738085	 091-2712-21629 091-265-643279 091-265-643128 091-11-7513320